The REVIEW

Published by the American Society For Metals

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Volume XVII | APRIL, 1944 | Number 4

Material Inspection For Aircraft Requires Thorough Methods

Reported by W. A. Mudge
The International Nickel Co., Inc.

New York Chapter—March 13 was aircraft night and the 100 members who attended the meeting learned of thoroughness to the nth degree as it is applied to the selection of materials for the Martin aircraft. C. G. Stephens, who has been with the Glenn L. Martin Co. for 15 years and is now inspection manager, was the speaker. R. F. Vines, Ford Instrument Co., was technical chairman.

Mr. Stephens introduced his subject by comparing aircraft construction in 1929 and 1944. In 1929, there were few materials and inadequate methods and standards for inspection. Today his staff inspects 35 alloy steels, 11 corrosion resisting steels, 15 aluminum alloys, 11 cast alloys, 14 brasses and bronzes, 4 magnesium alloys and many non-metallic materials. This requires experience and facilities unknown in the past, as well as careful training of inspectors, and necessitates thorough cooperation with many subcontractors to whom material is supplied.

Inspection is made on the basis of what can be used and not what can be rejected. Three divisions of the department — casting and forging, processing, and procurement—function together closely, making and supervising tests. Emphasis is placed upon process inspection so that no defective material will be delivered to the succeeding operation; both equipment and product are checked. Heat treating furnaces, for example, are checked every hour. This reduces rejections on final inspection.

Mr. Stephens also described methods in use for the qualitative identification of materials and cited their usefulness in segregating materials.

Demonstration of Induction and Flame Hardening Seen at Worcester

Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

Worcester Chapter—A demonstration of surface heat treating was given at the monthly meeting on Feb. 9 held at the Massachusetts Steel Treating Corp. plant in Worcester.

Prof. Carl G. Johnson of Worcester Polytechnic Institute and Morris Boorky, metallurgical engineer for the host company, directed the demonstration, which included hardening of gears and other machine parts by the flame process and by high frequency induction heating methods.

The committee in charge of the arrangements consisted of Harry E. Boorky, general manager of the Massachusetts Steel Treating Corp., and Charles H. E. Coster, co-chairmen; Thomas St. Pierre, George H. Campbell and C. Weston Russell.

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—Save it for reference.

Head New Ft. Wayne Group

Officers and Executive Committee of the Newly Organized Fort Wayne Chapter of the A.S.M. Seated, left to right, are F. C. Lehman, Jr., treasurer; E. J. Pavesic, chairman; R. J. McCracken, secretary. Standing, left to right, are Executive Committee Members J. A. Cameron, Cyril Grindrod, S. J. Stockett, H. A. McAninch, George Jennings. Vice-Chairman J. D. Nisbet and Executive Committee Member J. H. Clark are absent from the photograph.

Compliments

To ARTHUR T. CLARAGE, past national treasurer A.S.M., president of the Columbia Tool Steel Co., on his reelection as president of the Chicago Branch of the National Metal Trades Association.

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To RICHARD G. BYRNE, formerly on the advertising and production staff of *Metal Progress*, now serving with the U. S. Navy in the Pacific, on his promotion in rank from ensign to lieutenant (jg).

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To CLYDE WILLIAMS, director of Battelle Memorial Institute, Columbus, Ohio, on his engagement by the Association of American Railroads as technical consultant to advise the railroad industry on research matters.

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To EDWARD C. HOENICKE, assistant to the general manager, foundry division, Eaton Mfg. Co., Detroit, on his appointment as consultant to the Gray Iron Castings Section recently organized in the Forgings and Castings Branch of the War Production Board.

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To GEORGE K. DREHER, past chairman Milwaukee Chapter A.S.M., well known as a technical speaker before many chapters and groups, on his promotion to vice-president in charge of manufacturing, Ampco Metal, Inc., Milwaukee.

Ordnance Inspector's Methods Of Visual Examination Explained

Reported by H. N. Logsdon
Metallographer, Reynolds Metals Co.

Louisville Chapter—In a talk on "Visual Examination of Steel" at the February dinner meeting, Lt. Col. G. M. Enos, director of engineering for the Cincinnati Ordnance District, approached his subject from the viewpoint of the ordnance inspector who carries on his work without the help of microscope or other laboratory equipment.

The job of the ordnance inspector is to determine: (*a*) Whether the specimen under examination meets dimensional specifications, (*b*) whether it meets required quality standards, (*c*) what the causes of failure are in any items that are rejected.

His tools are gages, his eyes, his fingers and perhaps a small magnifying glass.

With these points in mind Colonel Enos explained the methods and tests for visual examination of steel specimens. A series of slides was used to illustrate types of failure and methods of testing.

New Chapter Formed In Fort Wayne, Ind. Naujoks First Speaker

Reported by Edward J. Pavesic
Studebaker Aviation Division

A petition for the formation of a new chapter of the American Society for Metals in Fort Wayne, Ind., has been submitted to the National Office and awaits only formal granting of a charter by the Board of Trustees at its meeting later in April.

The first meeting of the new chapter was held on March 28 at the Fort Wayne Chamber of Commerce with Waldemar Naujoks, chief engineer of the Steel Improvement and Forge Co., as the main speaker. Mr. Naujoks' subject was "Forgings in the War Effort and the Post-War Peace."

Officers Elected

The 91 members and guests present also heard an address of welcome by Clare Johnson, executive secretary of the Chamber of Commerce, who wish the chapter every success. Officers have been elected as follows:

CHAIRMAN—E. J. Pavesic, Assistant Metallurgist, Studebaker Corp.

VICE-CHAIRMAN—J. D. Nisbet, Laboratory Metallurgist, General Electric Co.

SECRETARY—R. J. McCracken, Metallurgist, Studebaker Corp.

TREASURER—F. C. Lehman, Chief Chemist and Metallurgist, Joslyn Mfg. & Supply Co.

EXECUTIVE COMMITTEE—C. Grindrod, Assistant Vice-President, Bowser, Inc.; S. J. Stockett, Laboratory Metallurgist, General Electric Co.; George Jennings, Superintendent, National Heat Treating Co.; Joseph Clark, Plant Metallurgist, International Harvester Co.; H. A. McAninch, Engineer, Warner Automotive Division; J. A. Cameron, Metallurgist, General Electric Co.

Forging Development Traced

Mr. Naujoks preceded his technical lecture by an able presentation of the aims of the Society, and an outline of the procedures for operating a local chapter.

He then traced the development of forging equipment from medieval times to present-day modern presses, drop hammers and forging machines. The importance of grain flow in forgings was given special consideration because of its effects on the properties of the finished part. The exact positioning of the flow lines will depend upon the shape of the forged part and the direction of important stresses in service.

What's NEW in THE REVIEW

Review of Current Periodical Literature:

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-29. **Some Aspects of Sintering Iron Ores.** R. Hay and J. McLeod. *Iron & Steel*, v. 17, Feb. '44, pp. 250-253.
Composition and procedure. 8 ref.

1-30. **Iron v. Scrap.** *Pig Iron Rough Notes*, no. 96, Winter, pp. 3-4.
Why the use of pig iron is more economical than scrap.

1-31. **Concerning Iron & Its Alloys.** F. E. Fisher. *Pig Iron Rough Notes*, no. 96, Winter, pp. 20-26.
Data relative to the production of iron and some of the fundamentals concerning its alloys, all of which have iron ore as their basis.

1-32. **Blast Furnace Moisture Control Study.** John J. Alexander. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 346-351.
The influence upon the furnace operation and pig iron analyses of maintenance of uniform blast moisture. To establish the performance on natural air, furnace and atmospheric data were obtained for test periods. Conditions of test given. Results prove benefits outweigh costs.

1-33. **Electric Furnace Smelting of Tin Concentrate from Sullivan Ore.** E. L. Jones and A. Thunaes. *Canadian Mining and Metallurgical Bulletin*, no. 382, Feb. '44, pp. 35-43.
Description of the highlights of smelting Sullivan tin concentrate, using an electric furnace process developed in Trail.

1-34. **Molybdenite in Canada.** H. H. Claudet. *Canadian Mining & Metallurgical Bulletin*, no. 383, March '44, pp. 87-98.
Metallurgy, uses and milling of molybdenite; occurrence in Canada.

1-35. **Proper Deoxidation Practice Improves Quality of Bessemer Converter Steel.** *Industrial Heating*, v. 11, March '44, pp. 406, 408.
The development of "killed" bessemer steel, a process which thoroughly deoxidizes the steel.

1-36. **Golden Manitou — New Zinc Producer.** Andrew Robertson. *Engineering & Mining Journal*, v. 145, March '44, pp. 74-79.
Geology and mineralogy, development, mining method, mucking-machine stopes, ring drilling, recovering ore left in vertical pillars, haulage and hoisting, ore treatment, and flowsheet.

1-37. **Chlorine as a Solvent in Gold Hydrometallurgy.** Garth L. Putnam. *Engineering & Mining Journal*, v. 145, March '44, pp. 70-73.
Disadvantages of cyanidation and methods of chlorination. 31 ref.

1-38. **Neglected Copper-Zinc Belt Revived Under War Demands.** John B. Huttl. *Engineering & Mining Journal*, v. 145, March '44, pp. 60-63.
Mill flowsheet Keystone Copper Corp.

1-39. **Magnesium Sources and Manufacture.** *Westinghouse Engineer*, v. 4, March '44, pp. 46-50, 56.
No nation can ever monopolize the sources of magnesium. Among metals it is surpassed in prevalence only by Fe and Al. It occurs in many ores, profusely scattered in large quantities over the earth. No nation that has a seacoast can be denied a supply of magnesium. Although the magnesium concentration in sea water is but 0.13%, each cubic mile of the ocean contains 4½ million tons; each 100 gallons contains about a pound.

2. PROPERTIES OF METALS

2-13. **Palladium: Some Properties and Uses.** J. C. Chaston. *Metallurgia*, v. 29, Jan., '44, pp. 133-134.
The latest available figures are given for the physical properties of palladium. Particular attention is directed to its capacity for dissolving hydrogen and transmitting it by diffusion. Some of the uses of this metal in pure form or as alloys are briefly discussed.

2-14. **The Fame and Fortune of Magnesium.** *Westinghouse Engineer*, v. 4, March '44, pp. 43-45, 56.
Mg is the number one glamour metal of the day, but it has required two world wars to bring it to a place of importance among the major metals. Now that war's insatiable demands for incendiaries and for airplanes have resulted in a U. S. production capacity of about 300,000 tons annually, and with the enormous improvement in magnesium technology that is resulting, the many alloys of magnesium—the lightest of all metals—will be important as postwar structural materials.

2-15. **On the Density, Thixotropy and Setting of Heterogeneous Silver Amalgams.** Douglas Rennie Hudson. *Metallurgia*, v. 29, Feb. '44, pp. 207-213.
The density of silver amalgams prepared from very pure metals has been determined over the heterogeneous range. Throughout the interval the density varies little from that of pure mercury, approximately 13.6, despite the lower density and smaller atomic volume of silver, and the existence of an inter-metallic compound. These amalgams show reversible thixotropy very perfectly. On standing they "set" spontaneously, from the fluid or plastic state which characterizes them on formation, to a semi-solid relatively hard mass; this hardening is due to the establishment of a reseau of solid phase, in which the mercury is held like water in a sponge. Setting is accompanied by a diminution of 1 to 1½% in density in a few days. 35 ref.

3. PROPERTIES OF ALLOYS

3-36. **The Structure and Segregation of Two Ingots of Ingot-iron, One Containing Lead.** L. Northcott and D. McLean. *Engineers' Digest*, v. 1, Feb. '44, pp. 147-148.
Description of examination made to determine the segregation in a low-carbon steel ingot containing lead, and the influence of lead upon machinability.

3-37. **Iron-Silicon Alloy of High Initial Permeability.** *Engineer's Digest*, v. 1, Feb. '44, pp. 183.
Purification of materials to achieve high magnetization.

PHOTOSTAT copies of any of the articles contained in this Literature Review are available upon request. Cost is 35c per page and can be computed from the number of pages given in the annotation. Inasmuch as this photostating service is provided at cost, remittance should accompany the order. Address your request to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, or use the Reader Service Coupon on page 3.

3-38. **Use of NE Types of Alloy Steels to Continue After the War.** Charles M. Parker. *American Machinist*, v. 88, March 2, '44, pp. 83-86.
Wartime experience with lower alloyed compositions has proved their long range value and economy. Alloying elements conserved, production status of NE steels, five NE steels are most popular, specifications based on composition, new tests balance alloys, changes needed in describing steels, postwar alloy supply will be low.

3-39. **The Internal Mechanics of Cast Iron.** Gustav Meyersberg. *Iron & Steel*, v. 17, Feb., '44, pp. 243-247.
The material is regarded as a high carbon, high tensile steel containing a relatively large volume of graphite—of negligible tensile strength, irregular form and distribution, and conducing to the realization of the detrimental results produced by external forces. These effects are discussed, on the basis of experimental work carried out in Germany prior to the war.

3-40. **Iron Alloy Scaling.** M. J. Day and G. V. Smith. *Iron & Steel*, v. 17, Feb., '44, pp. 255-259.
Heat resistance at various temperatures. 2 ref.

3-41. **Automotive Applications of National Emergency Steels.** T. M. Snyder. *Steel*, v. 114, March 6, '44, pp. 128, 130.
Carburizing properties, Brinell hardness, tensile strength, reduction of area, elongation curves, and hardenability of SAE and NE steels compared.

3-42. **Properties of Killed Bessemer Steel.** E. C. Wright. *Steel*, v. 114, March 6, '44, pp. 126, 162, 164, 166.
Methods of killing, variation in heats, influence of phosphorus, properties of killed steel.

3-43. **The Constitution of Magnesium-Manganese-Zinc-Aluminum Alloys in the Range 0-5% Magnesium, 0.2% Manganese, and 0.8% Zinc.** *Metallurgia*, v. 29, Jan. '44, pp. 147-148.
The equilibrium diagram below 400°C. 4 ref.

3-44. **The Constitution of Silver-Magnesium Alloys in the Region 0-40 Atomic Per Cent Magnesium.** *Metallurgia*, v. 29, Jan. '44, pp. 151-152.
Discussion of the equilibrium diagram of Hansen and Andrews and Hume-Rothery.

3-45. **The Alkali Metals in Alloys.** O. P. Einerl, and F. Neurath. *Chemical Age*, v. 50, Feb. 5, '44, pp. 144-147.
A survey of their practical application. 36 ref.

3-46. **Engineering Alloys Containing Calcium.** C. L. Mantell and Charles Hardy. *Metals & Alloys*, v. 19, Feb. '44, pp. 364-367.
Tabulation of engineering alloys containing calcium, giving data on compositions, properties, uses, patents, etc.

3-47. **The Inter-Relation of Age-Hardening and Creep Performance. Part I—The Behaviour in Creep of an Alloy Containing 3% Nickel and Silicon in Copper.** C. H. M. Jenkins, E. H. Bucknall, and E. A. Jenkinson. *Institute of Metals Journal*, v. 2, March 15, '44, pp. 57-79.
Behaviour under creep conditions of a wrought copper alloy containing 2.4% nickel with 0.6% silicon, after different thermal treatments. These bring about aging in the alloy and render possible a comprehensive survey of its properties in relation to various amounts of either age-hardening or age-softening in the range 15 to 625° C. 7 ref.

3-48. **Nitralloy Steels.** *Automobile Engineer*, v. 34, Feb. '44, pp. 71-72.
A range of tough core alloys for various applications. Properties of Nitralloy steels.

3-49. **Strength of Shafts.** *Automobile Engineer*, v. 34, Feb. '44, p. 63.
Effect of transverse holes, splines and shoulders on torsional fatigue.

3-50. **Influence of Improved Magnetic Alloys on Design Trends of Electrical Instruments.** M. S. Wilson and J. M. Whittenton. *Electrical Engineering*, v. 63, no. 3, March '44, pp. 100-104.
Properties of a new magnetic alloy and comparison of its characteristics with other permanent-magnet materials used in small panel electrical indicating instruments of the permanent-magnet moving-coil type. The use of a new cobalt-molybdenum-iron alloy as a permanent magnet material in an indicating instrument and its influence on design trend.

3-51. **Effect of Stretching Clad 24S Aluminum.** Earl R. Weiher. *Steel*, v. 114, March 27, '44, pp. 107-108.
In heat treating Alclad aluminum alloy for use in aircraft, distortion of the metal takes place as a natural consequence. However, in the process of straightening the material, it also is stretched, thus developing a higher yield strength. By increasing the percentage of stretch beyond that required to straighten the material, the initial loss in strength of structural sections used in compression could be regained with a resultant increase in yield strength.

3-52. **Fatigue Strength Properties of SAE X4130 Tubing.** George Sachs and George Espey. *Iron Age*, v. 153, March 23, '44, pp. 62-67.
Most widely used material for aircraft structures is normalized or stress relieved SAE X4130 tubing. This report on the research project conducted under the sponsorship of the Ohio Seamless Tube Co., Shelby, Ohio, discusses the effect of normalizing and stress relief annealing on the fatigue strength properties of this commercial tubing. 4 ref.

3-53. **Wartime Non-Ferrous Metals.** E. G. Jennings. *Canadian Metals & Metallurgical Industries*, v. 7, March '44, pp. 21-23.
Tin bearing alloys—manganese, silicon and aluminum bronzes.

3-54. **The Effect on the Hardenability of Small Additions of Chromium and Molybdenum to a Grain-Size-Controlled 0.9% Nickel Steel.** W. Steven. *Metallurgia*, v. 29, Feb. '44, pp. 177-180.
Effect of simultaneous additions of Mo and Cr to a particular steel over the range zero to 0.6% of Mo and 0.2 to 0.8% of Cr was determined by the Jominy end-quench method. The grain size of the steel investigated was kept as nearly as possible constant. The results indicate that the hardenability of these steels does not vary as the quenching temperature is altered from 850 to 880°C. or as the time of soaking at the quenching temperature is increased from 20 to 60 min.

3-55. **Aluminum Alloy Sheet and Strip in Aircraft.** E. G. West. *Metallurgia*, v. 29, Feb. '44, pp. 200-201, 230.
Sheet and strip aluminum alloys play an important part in the design of modern aircraft. In many respects their influence has been revolutionary, especially in the stressed skin wing construction in which the sheet metal not only covers, but adds strength to the structure. The applications of aluminum alloy sheet and strip in aircraft have been greatly facilitated by development in fabrication and in various forms of jointing. Here the author briefly outlines some applications and directs attention to the value of sheet and strip in the post-war years.

4. STRUCTURE

4-6. **Twinning in Zinc Oxide.** M. L. Fuller. *Journal of Applied Physics*, v. 15, Feb. '44, pp. 164-170.
A crystallographic analysis of a characteristic shape of particle found in zinc oxide produced by burning zinc vapor has been made with the aid of the electron microscope. This particle consists of four needle-shaped crystals united at a common juncture. The spatial angles among the four crystals were determined from stereoscopic micrographs with the use of the stereographic projection. The crystals were found to be united by twinning on planes of the form (112).

4-7. **A Note on the Microstructure of High Silicon Acid-Resisting Iron.** J. E. Hurst and R. V. Riley. *Metallurgia*, v. 29, Jan. '44, pp. 145-147.
An unusual type of etched structure, referred to as the "barley shell" structure, has been described by various investigators of the Fe-Si alloys. The authors have observed it in their examination of commercial Fe-Si alloys containing upwards of 19% Si, and have recorded some conditions of etching under which it is obtained and some observations on its characteristics.

4-8. **Model Construction.** E. M. Smith. *Metal Progress*, v. 45, March '44, pp. 510-511.
Model illustrating equilibrium or structural conditions in ternary systems.

5. POWDER METALLURGY

5-5. **Pressing and Sintering Carbide Tool Tips.** W. T. Muirhead. *Metals & Alloys*, v. 19, Feb. '44, pp. 369-372.
Use of sintered carbide tools for the highest speed machining of steel and other materials. The tools are made by brazing carbide tips to a steel or cast iron shank. The manufacture of these tips, described in this article, is a major application of powder metallurgy. Presses and dies used are described.

5-6. **Efficient Sintering with a Dwight Lloyd Unit.** M. V. Cover. *Iron Age*, v. 153, March 2, '44, pp. 46-49.
How to increase the amount of sinter made in a Dwight Lloyd machine by the use of proper materials and efficient design. Other critical factors influencing output.

6. CORROSION

6-8. **Cylinder-Bore Wear and Corrosion.** Alex Taub. *Automotive and Aviation Industries*, v. 90, March 1, '44, pp. 36-38, 60.
Cylinder wall temperature, spark timing, effect of fuel, the oil film as a protection against corrosion, piston ring design.

6-9. **Deaerators Make Difficulties for Testing Chemists.** J. R. McDermet. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 366-369.
Function of a deaerator; ammonia and CO_2 function as electrolysis; CO_2 a weak acid in solution.

7. PROTECTION

7-22. **Supplemental Protection for Black-Oxide Finishes.** Mark Weisberg and Edward A. Parker. *Steel*, v. 114, Feb. 28, '44, pp. 109, 136.
Salt-spray tests on various supplemental coatings applied over black-oxide finishes show an extremely wide variation in additional protection afforded. All black-oxide coatings are less than 0.0002 in. thick and are slightly porous. Thus, for most uses, other than very mild indoor environment, it is necessary to use supplemental coatings such as oils, greases, waxes, lacquers or paint.

7-23. **Control of Fine Finished Surfaces.** J. Ferdinand Kayser. *Aircraft Engineering*, v. 16, Jan. '44, pp. 25, 28.
Method of measuring and controlling certain types of surface finishes by microscopes.

7-24. **Galvanising and Corrugating Sheet Metal.** H. W. Dickinson. *Engineering*, v. 157, Jan. 21, '44, pp. 46.
Origins of the galvanising and corrugating processes.

7-25. **Rapid Anodizing and Painting of Aircraft Parts.** Herbert Chase. *Metals and Alloys*, v. 19, Feb. '44, pp. 342-345.
Handling equipment, anodizing, spray-painting.

A. S. M. METAL LITERATURE REVIEW

7-26. Decorative Anodizing for Post-War Products. G. O. Taylor. *Metallurgia*, v. 29, Jan. '44, pp. 121-125.
Under present conditions aluminum alloy products are usually given a utilitarian finish, but the time may come when advantage can be taken of the many attractive finishes, in a large range of colors and tones, which are obtainable by anodizing, suitable for harmonizing, or contrasting with any decorative scheme.

7-27. Hard Layers on Toolsteels. James P. Gill. *Metal Progress*, v. 45, March '44, pp. 488-490.
Chromium plating, nitriding, carburizing of toolsteels.

7-28. Re-Galvanizing of Welded Joints. *Iron Age*, v. 153, March 16, '44, pp. 66-67.
Successfully re-galvanizing on the job with an alloy called "Galv-Weld" to prevent corrosion can be applied to seams made by arc and gas welding. Applications in shipbuilding.

7-29. Production Phases of Hot Dip Galvanizing. Wallace G. Imhoff. *Steel*, v. 114, March 13, '44, pp. 110-112.
Heat from bath; higher temperature required with increased production, flux carry over.

7-30. Stretching the Life of a Nail Machine Crankshaft Through Metal Spraying. Jess Copp. *Wire & Wire Products*, v. 19, March '44, pp. 176-177, 196-197.
Maintenance has played an important role in keeping war machines in operation. How Metallizing is keeping nail mills going described.

7-31. Black Oxide Coatings on Stainless Steels. Irvine Clingan. *Metal Finishing*, v. 42, March '44, pp. 139-140.
Surface blackening stainless steels by treatment in molten dichromate at temperatures in excess of 615° F. The resulting black coating possesses a high degree of strength and elasticity, shows good resistance to wear and abrasion, improves the corrosion resistance of the parent metal in various corrosive media, does not produce any dimensional change in the treated part, and the color is permanent. 2 ref.

7-32. Colored Finishes. Marc. Darrin and L. G. Tubbs. *Metal Finishing*, v. 42, March '44, pp. 141-144.
Colored finishes may be readily obtained on chromic acid anodized Al and its alloys, in much the same manner as black finishes. The procedure may be modified to produce almost any desired color. This report describes how these colored finishes—red, yellow, green, blue—are obtained and the effect of some variations in procedure. Results obtained with a number of dyes. Instructions for some typical finishes on commercially pure Al and several of its alloys. 6 ref.

7-33. Surface Finish. W. E. R. Clay. *Automobile Engineer*, v. 34, Feb. '44, pp. 73-78.
Review of the various processes including measurement.

7-34. Tin Plating. *Products Finishing*, v. 8, March '44, pp. 20-22, 24-28.
History and development of tin as a coating agent. Black plate, hot-dipping, electrotinning, electrolytic lines, finishing.

7-35. Methods of Evaluating Metal Finishes. Jeffrey R. Stewart. *Products Finishing*, v. 8, March '44, pp. 36-37, 39-40, 42.
During wartime, methods of evaluating protective coatings for metals are changed or improved so rapidly that magazine articles must supplement previously printed texts. Up-to-date information on several important tests.

7-36. Successful Hard-Facing of Dies Depends Upon Proper Alloy. *Tool & Die Journal*, v. 9, March '44, pp. 95-98.
Punches for hot operations such as shell piercing can be protected by facing at low cost with an arc-welded deposit of a well-known nickel-base alloy.

8. ELECTROPLATING

8-23. Electroplating Steel for Protection and Appearance. M. B. Diggin. *Iron & Steel Engineer*, v. 21, Feb. '44, pp. 43-46.
By the use of proper "overcoats," steel may be protected and decorated so as to render it applicable to many uses thus far held by other materials. . . Postwar competition may put the steel plants into the electroplating business.

8-24. The Chemistry of Electroplating. C. B. F. Young. *Products Finishing*, v. 8, March '44, pp. 46-48, 50, 52, 54, 56, 58, 60.
True solutions and their properties discussed. Suspensions, emulsions, colloidal solutions, and the determination of atomic weights also discussed.

8-25. Corrosion and Its Prevention in the Plating Room. Alfred Baechlin. *Metal Finishing*, v. 42, March '44, pp. 136-138, 155.
Flooring materials, tile floor construction, paint for protection, protecting exhaust ducts, protecting the accessories.

8-26. Republic Uses Two Electrotinning Lines at Its Niles Plant. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 343-345.
Fire conservation, continuous tinning process described.

8-27. How to Chromium Plate for Greater Tool Life. R. W. Bennet. *Machinery*, v. 50, no. 7, March '44, pp. 190-194.
Procedure followed at the Springfield, Mass., plant of the Westinghouse Electric & Mfg. Co. to increase tool life with consistent and successful results.

8-28. Alkaline Zinc Plating Sodium Zincate Solutions. N. A. Tope. American Electroplaters' Society *Monthly Review*, March '44, pp. 229-246.
Change from cadmium to zinc plating. Equipment, solutions and technique used.

8-29. The Fundamentals of Chemistry for Electroplaters. Samuel Glasstone. American Electroplaters' Society *Monthly Review*, March '44, pp. 254-257.
Importance of atomic weights, determination of equivalent weights, equivalent weight and atomic weight and approximate atomic weight methods.

8-30. Novelties in Electroplating. *Steel*, v. 114, March 20, '44, pp. 94, 128-129.
Some studies in plating colors, depositing alloys and the like.

9. ELECTROMETALLURGY

9-2. How Electrolytic Antimony Is Made at Sunshine Plant. W. Church Holmes. *Engineering & Mining Journal*, v. 145, March '44, pp. 54-58.
Flowsheet of plant.

10. ANALYSIS

10-9. Metallurgical Microchemistry. E. C. Pigott. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 239-248, 272.
Microchemical analyses of metals showing how, after an approved technique has been established, reliable and consistent results can be obtained for most elements at a fraction of the cost of conventional chemical analyses, on a minute portion of sample.

10-10. The Determination of Sulphur and Phosphorus in Pig Iron. Blast-Furnace Materials Analysis Sub-Committee. *Engineers' Digest*, v. 1, Feb. '44, pp. 187-188.
Sampling, and sulphur and phosphorus determinations.

10-11. Identification of Non-Metallic Inclusions in Steel. C. A. E. Wilkins. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 211-224.
Identification of inclusions in steel and a simple and easily workable system for the rapid identification of the more common inclusions.

10-12. Rapid Determination of Chromium, Nickel and Manganese. R. H. Jacoby. *Foundry*, v. 72, March, '44, pp. 111-112, 178.
Method of analysis for determining residual alloy percentage in ordnance work.

10-13. A Review of Analyses for Gases in Steel. Clarence E. Sims and Geo. A. Moore. *American Foundryman*, v. 6, March, '44, pp. 15-17.
A review of the Fourth Report (paper No. 22, July 1943) of the Oxygen Subcommittee of the Committee on the Heterogeneity of Steel Ingots of the British Iron and Steel Institute. Determination of oxygen, hydrogen, nitrogen, vacuum heating methods.

10-14. Polarographic Technique: A Survey. J. T. Stock. *Metallurgia*, v. 29, Jan. '44, pp. 155-158.
The polarograph, and in particular the recording polarograph, offers a useful means of estimating traces and minor constituents. Many variations in technique may be employed to suit different requirements, and a number of these are described.

11. LABORATORY APPARATUS, INSTRUMENTS

11-18. Gaseous Diffusion as a Tool for Locating Critical Points in Metals and Alloys. Howard S. Coleman and Henry L. Yeagley. *Journal of Applied Physics*, v. 15, Feb. '44, pp. 125-127.
The rate at which a diatomic gas diffuses through the metal disk into a vacuous space depends upon the pressure and the temperature. 6 ref.

11-19. Roll Pressure Measurement by Means of an Electric Strain Gage. D. W. Redepenning. *Engineers' Digest*, Feb. '44, pp. 174-175.
Determination of the measurement of the rolling pressure important for controlling the physical properties of final rolled product. Description.

11-20. Surface Replicas Containing Dye for Use in the Light Microscope. Vincent J. Schaeffer. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 263-265.
The use of replicas as a permanent record of the structure which may be destroyed as a result of further work on a specimen under examination.

11-21. Time Saver in Dark Room. J. I. Crabtree. *Metal Progress*, v. 45, March, '44, p. 512.
Silver plated copper coil, through which cold water is circulated for cooling developer solutions.

11-22. Electronic Circuit Maintains Edge-Control on Moving Strip. *Product Engineering*, v. 15, March '44, p. 157.
Simplified circuit for electronic edge control that works without touching the material or relying on moving parts.

11-23. Equivalent Circuits of the Electromagnetic Field. J. F. McAllister. *General Electric Review*, v. 47, March '44, pp. 9-14.
Methods of analyzing complex circuit problems by construction of equivalent circuits.

11-24. High-Speed Photolight. S. L. Bellinger. *General Electric Review*, v. 47, March '44, pp. 31-33.
Readily portable and compact; lamp is capable of emitting thousands of brilliant flashes during its lifetime. Valuable in studying high-speed motion.

11-25. Forecasting Tool and Gage Requirements. Sergius D. Brootskoos. *Iron Age*, v. 153, March 16, '44, pp. 68-72.
Procedure that should be followed when using the author's formulas in setting up gage purchases. An example shows how the rules of tool and gage procurement are applied to a broaching operation in which the number of broaches in use and those held in reserve are accurately determined.

11-26. Recording and Indicating Instruments for Steel Mill Service. P. E. Twiss and R. M. Powell. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 356-357.
Application and description.

11-27. High-Speed Movement. *Aircraft Production*, v. 6, March '44, pp. 125-128.
New stroboscope tachometer and photographic equipment for studying machine performance.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-52. Damping Capacity at Low Stresses in Light Alloys and Carbon Steel, with Some Examples of Non-Destructive Testing. Leopold Frommer and A. Murray. *Institute of Metals Journal*, v. 11, Jan. '44, pp. 1-50.
This work was undertaken to establish (1) a reliable and accurate method for measuring the damping capacity of materials, particularly metals; (2) the significance of the damping capacity as a physical property of the material in terms of other known characteristics; (3) the influence exerted by structural defects, such as cracks and porosity, upon the measured damping and thus to afford means for non-destructive testing; and (4) the practicability of employing damping measurements as a means of quality control and inspection of raw material and finished components.

12-53. The Riding and Wearing of Railway Carriage Tyres. C. W. Newberry. *Engineering*, v. 157, Jan. 21, '44, pp. 57-60.
Examination and explanation of tyre profile records.

(Continued on page 5)

The REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), O.

Subscriptions one dollar a year. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless.....*Editor*
M. R. Hyslop.....*Managing Editor*

Cleveland, Ohio—April, 1944
Volume XVII Number 4

Applies Theory to Study of Tempering High Speed Steel

Reported by Walter M. Saunders, Jr.
Consulting Chemist and Metallurgist

Rhode Island Chapter—The second official visit of Prof. Morris Cohen of M. I. T. occurred on the evening of Feb. 2, almost three years after his first appearance in Providence. Now it is the hope of about 150 members and guests who heard Dr. Cohen speak on "The Application of Theory to Practical Heat Treating" that he will visit us as often as he can arrange it.

As a pioneer in the study of the tempering of high speed steel, Dr. Cohen naturally devoted the major portion of his talk to this subject. Much has been published by Dr. Cohen and his associates, and probably most metallurgists are now familiar with the theory behind double tempering and the efficacy of such a treatment. What interests the practical heat treater is that austenite transforms on cooling from, rather than at, the tempering temperature, and Dr. Cohen's work shows that two successive 2½-hr. draws are required to give optimum physical properties.

Another part of Dr. Cohen's talk concerned the isothermal transformation of high speed steels in the range of 500 to 600° F. Here, as might be expected, bainite is the end product, with the characteristic properties associated with such a structure. Toughness is increased, but with some sacrifice of hardness.

A type of interrupted quenching in the martensite range has also been investigated by Dr. Cohen, and found to be very useful for intricate tools made from high speed steel, provided that the subsequent tempering treatment is properly adjusted.

On the subject of the "cold treatment" of high speed steels, Dr. Cohen felt that there is merit in such practice, but would not subscribe to all the advantages claimed. He has reports of phenomenal results, but being conservative (since he comes from Boston), he feels that more work is required. From results he now has, it appears that excessively low temperatures are not required, and there are several other angles which should be more searchingly investigated. Another reason why the Rhode Island Chapter hopes to have him come again soon!

Payson Reveals Time-Temperature Effects In Austenizing; Preheating Stressed

Reported by Stewart M. DePoy
Metallurgist, Delco Products Div., G.M.C.

Dayton Chapter's largest attendance of the season turned out Feb. 9 to hear Peter Payson of the Crucible Steel Co. of America on "Annealing." Mr. Payson's extensive research on constant temperature transformation of austenite to the machinable structures is one of the newest developments in modern metallurgy.

Mr. Payson revealed the effect of austenizing time and temperature on the finished product. He emphasized the results of thorough preheating before austenizing, this procedure being necessary with the higher carbon alloy steels to obtain the softest structure.

His lantern slides of the TTT curves covered all important steels in use today, both productive and tool steels. These curves help the metallurgist to pick the transformation temperature for the structure that he hopes to attain. The softest structure is not always the most desirable, depending upon the operation performed on the metal, and the finish desired.

300 Attend Milwaukee Chapter Silver Jubilee

Milwaukee Chapter celebrated its 25th anniversary with a special dinner meeting and program on March 7. The chapter was established on March 5, 1919, with 55 members and now has an enrollment of 475 regular members, 49 sustaining members and 37 junior members. More than 300 were present at the Silver Jubilee party.

Speakers at the anniversary meeting were Lawrence S. Hamaker, assistant general sales manager of Republic Steel Corp., who spoke on "Light Metals and Plastics Vs. Steel," and Harold R. Wilde, director of the Great Lakes Harbor Association. who discussed "The Value of Technical Societies to Industry." Charles I. Wesley, president of the Wesley Steel Treating Co. of Milwaukee and first secretary of the Chapter, presided. Tribute was paid to the 22 past chairmen of the Chapter and to the charter members.

Practical Ways of Checking Galvanic Corrosion Shown

Reported by H. P. Henderson
Prod. Engr., New Departure Division, G.M.C.

Hartford Chapter — A subject of rather technical nature, "Applications of Principles of Galvanic Corrosion" was presented at the March meeting by F. L. LaQue, metallurgical engineer of the development and research division of International Nickel Co. However, Mr. LaQue brought out the practical methods of checking corrosion due to differences in potentials of dissimilar metals in the presence of any electrolyte that would cause cell action.

He explained methods of measuring these values and stressed the importance of considering the area of one metal compared to another which would affect the corrosion rate at the junction of two dissimilar metals. Methods of limiting corrosion rates, used particularly in ship construction, where the cell action in sea water due to differences in potentials of the metals can cause accelerated corrosion. were explained

In choosing metals for construction where corrosion is an important factor, the speaker pointed out that care should be taken to consider their relative position to each other in the electromotive series. This greatly affects the current value which can flow under the right conditions and produce corrosion.

Mr. LaQue's talk was accompanied by slides showing corrosion tests, charts for values of currents and potentials of metal combinations, and schematic diagrams of methods to check corrosion mechanically.

WPB Names French Asst. Dir. Raw Materials

A.S.M. Past National President Herbert J. French, assistant manager of the Development and Research Division, International Nickel Co., and formerly chief of the Metallurgical and Conservation Branch of the Steel Division, War Production Board, has been named assistant director for raw materials and facilities of the Steel Division.

Berlien Demonstrates Unique Tricks for Heat Treater

Reported by Paul F. Ulmer
Metallurgist, Link Belt Co.

Indianapolis Chapter—The speaker at the February meeting, G. B. Berlien, chief metallurgist of Lindberg Steel Treating Co., presented the practical side of heat treating, discussing some of the causes of quench cracks in tool steels. Motion pictures in color with sound illustrated several unique tricks the heat treater can use when the simpler methods do not suffice.

Most interesting of these was a home-made device for spinning long, slender tools and shafts, which ordinarily must be straightened after quenching. Incidentally, much of the warpage can be removed from such parts by rolling them between heavy, flat plates heated to about 450° F. immediately after quenching, according to the speaker.

Another operation which may come in handy is the quenching of rings on the outside so that the bore is shrunk. This is accomplished by placing the hot ring on a piece of paper on a wood shelf, which is lowered into the quenching medium, carefully, only enough to bring the liquid to the top. None is allowed to get into the bore until the bore is shrunk sufficiently.

Experts and Judges Battle In Quiz; Eight Win Dinners

Reported by James C. Erickson
Plant Metallurgist, John Deere Plow Works

Tri-City Chapter—Metallurgical Quiz Night, held March 14 in Rock Island, Ill., was staffed by a panel of five experts and a board of three judges. After dinner, the experts were charged with the responsibility of upholding the honor of the Chapter, the judges were given wide powers of interpretation, and the battle was on.

Each member had the privilege of submitting a question with which he thought he could stump the experts and earn himself a free dinner at the April Smorgasbord. (Our wise treasurer, unwilling to stake the Chapter's financial security on the wisdom of the experts, limited all questions to those not of controversial nature!)

Thirty-six questions were mangled in a one-hour prepared program. In the following ten-minute period, the audience was allowed to complete the massacre.

As the evening passed, no one could decide whether the judges or the experts were doing most to crash the Chapter on the rocks of financial disaster—eight of an audience of 75 members and guests, who turned out on a bad evening to see their favorite expert, were awarded free dinners as "expert-stumpers."

Acting as judges were Clyde Burgston, Deere & Co.; John Hoffman, Deere & Mansur Works; and George Uhlmeyer, Iowa-Illinois Gas & Electric Co.; while the board of experts consisted of Ted Burkland, Deere & Co.; Russell Swartz, Ordnance Steel Foundry; Major Paul Cunnick, Rock Island Arsenal; Henry Curtis; and Vance Uhlmeyer, Iowa-Illinois Gas & Electric Co.

Metal Literature Review—*Continued*

12. TESTING AND INSPECTION

(*Continued from page 3*)

12-54. **A Concentricity Testing Fixture.** *Machinery (London)*, v. 64, Jan. 20, '44, p. 63.
Development of fixture for testing the concentricity of the finished outside cylindrical surface of a cone with its bore.

12-55. **Magnetic Methods for Testing Iron.** Rudolf Lessow. *Engineers' Digest*, v. 1, Feb. '44, pp. 172-173.
Magnetic methods which make use of electrical measurements may be used to draw conclusion regarding composition of tested material, previous treatment, dimensions.

12-56. **Creep of Metals.** Saul Dushman, L. W. Dunbar, and H. Huthsteiner. *Journal of Applied Physics*, v. 15, Feb. '44, pp. 108-124.
Experimental procedure, recording of elongation, theory, results on Al, Al-Mg, Pt, Ni-Mo, Ag. 16 ref.

12-57. **Selecting, Evaluating and Specifying Metallic Materials.** H. W. Gillett. *Foundry*, v. 72, March '44, pp. 106, 166-175.
Data relating to castings; certain properties of a material are of little value in determining its adequacy for a specific use, and discusses various determinations of the properties of metallic materials which are expressed in psi.

12-58. **Hardenability of 4150 Steel.** H. L. Walker, E. J. Eckel, J. Hino and F. H. Mueller. *Metals and Alloys*, v. 19, Feb. '44, pp. 346-350.
The hardenability at the center of SAE 4150 bar stock may be different from that at the surface. Shows that this anomalous center behavior is due to segregation and suggests heat-treating and testing practices to minimize its effects.

12-59. **Effective Time Control Setup for Stress Analysis Work.** Victor M. Kibardin. *Aero Digest*, v. 44, Feb. 15, '44, pp. 111-112, 215, 217-218.
Problems involved in stress analysis standardization; method to overcome these difficulties and application method discussed.

12-60. **Improved Method of Testing Steel Forgings at Chevrolet Forge.** P. D. Aird. *Modern Industrial Press*, v. 6, Feb. '44, pp. 24, 26.
Improved method for handling tests of heat treated steel forgings in the manufacture of parts for Pratt & Whitney aircraft engines. The new method saves 279 lb. of critical steel per engine.

12-61. **Doubling Cassettes in Emergencies.** B. A. Kornhauser. *Metal Progress*, v. 45, March '44, pp. 509-510.
When radiographic department is near the upper limit of its X-ray equipment and thus requiring the use of intensifying screens, the scheme set forth will double the number of film cassettes available.

12-62. **Early Detection of Fatigue Cracks.** Lawrence Ferguson. *Metal Progress*, v. 45, March '44, p. 512.
Detect the formation of fatigue cracks at an early stage by stretching them slightly (not over 5%) in a tensile testing machine.

12-63. **The Resin Method of Indicating Yield in Metals.** *Metal Progress*, v. 45, March '44, p. 512.
Resin coatings for indication of locations where metal is in distress are recommended for complicated stress systems in large structures at atmospheric temperatures.

12-64. **Notch Bend Test for Thin Stock.** S. L. Hoyt. *Metal Progress*, v. 45, March '44, p. 512.
Test devised by Heyn useful to determine how a pipe may behave with a screw thread on the end or the flat stock when blanked and formed.

12-65. **The Mottling of Aluminum Alloy Radiographs.** W. H. Glaisher, W. Betteridge, and R. Eborall. *Institute of Metals Journal*, v. 2, March 15, '44, pp. 81-89.
The mottled appearance frequently observed in radiographs of Al alloy castings has been investigated and shown to be a diffraction effect due to the irregular distribution of Laue spots from individual crystal grains, and the weakening of the transmitted beam when this diffraction occurs. No satisfactory method of obviating the defect, and thus making material faults more clearly visible, has been arrived at. 2 ref.

12-66. **A Simple Method of Control for Fine-Finished Surfaces.** J. Ferdinand Kayser. *Machinery* (London), v. 63, Dec. 30, '43, pp. 741-743.
A method of estimating surface finish by using a microscope to observe the interference fringes produced by monochromatic light.

12-67. **Allison Eliminates Faulty Castings by Use of Target Inspection Fixtures.** B. H. Yingling. *American Machinist*, v. 88, March 16, '44, pp. 125-135.
Shaped targets are used; each fixture first qualified; thirteen templets in one fixture; target indicates stock removal; square spindles for movable targets.

12-68. **Studies in Three-Dimensional Photoelasticity.** M. M. Frocht. *Journal of Applied Mechanics*, v. 11, March '44, pp. A-10-A-16.
Stresses in bent circular shafts with transverse holes —correlation with results from fatigue and strain measurements.

12-69. **Relations Between the Notched Beam Impact Test and the Static Tension Test.** C. W. MacGregor and J. C. Fisher. *Journal of Applied Mechanics*, v. 11, March '44, pp. A-28-A-34.
Results of static tension tests of both notched and uniform bars are compared with notched beam impact tests through the use of true stress-strain values. For the materials tested and under the temperature conditions imposed, it was found that the effect of drawing and testing temperatures on the energy absorbed per unit of volume was essentially the same for both static notched tension and notched beam impact tests. 19 ref.

12-70. **Method for Estimating the Shear Modulus of Elasticity.** L. E. Welch. *Product Engineering*, v. 15, March '44, pp. 215-216.
Mathematical development of equation.

12-71. **Primary-Exposure X-Ray Method for Reproducing Templates.** Thomas Miles. *Product Engineering*, v. 15, March '44, pp. 190-193.
Advantages and limitations of the primary-exposure method of template reproduction, one of the two X-ray methods now in use, are discussed. Procedures for preparing lay-outs and metal negatives are given in full, as well as details of the reproduction process.

12-72. **Some Principles of the Shewhart Methods of Quality Control.** W. Edwards Deming. *Mechanical Engineering*, v. 66, March '44, pp. 173-177.
The statistical method in a quality-control program can be made a potent factor in meeting the demands, because it has the effect of: Increasing the safety and performance of product; decreasing the amount of inspection required, yet attaining better quality assurance; decreasing the production of defective material by attaining greater uniformity at a safe distance from the tolerances; giving early warning on changed conditions of manufacture that may cause trouble; improving vendor-purchaser relations by providing better records; providing a rational basis for setting tolerances with regard to requirements in service, and economics of production.

12-73. **Quality Control in Manufacture of Small-Arms Ammunition.** Hugh M. Smallwood. *Mechanical Engineering*, v. 66, March 44, pp. 179-182.
The application of quality control to the process inspection of small-arms ammunition. Results obtained.

12-74. **The Spark Test for Ferrous Metals.** *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 352-355, 394.
Practical description of this method of identifying alloy steels.

12-75. **X-Rays Now Gage Propeller Blade Thickness.** H. P. Moyer. *Aviation*, v. 43, no. 3, March '44, pp. 147, 275-276, 279-280, 283-284, 287-288.
Method described affords close tolerances, replaces unsatisfactory sectioning and caliper methods. New thickness-check procedure is applicable in processing any ferrous products.

12-76. **Electronic Detection of Pinholes.** Harold J. Hague. *Steel*, v. 114, March 20, '44, pp. 108, 110.
Device is capable of locating holes 0.001 in diameter in steel strip traveling at 1000 ft. per min. All off-grade stock, such as heavy and light gage sheets and those with minute holes, is routed into separate piles. Strip from 6 to 62 inches wide may be inspected and assorted.

12-77. **Cooperative X-Ray Research.** *Steel*, v. 114, March 20, '44, p. 96.
Program uses "all-seeing" eye of million-volt unit to eliminate defective castings before machining and call attention to flaws preventable by changes in casting design or procedure.

12-78. **Small Arms Inspection.** M. L. DeGuire. *Army Ordnance*, v. 26, March/April, '44, pp. 293-298.
The task of insuring quality weapons and ammunition.

12-79. **Strain-Gauge Rosette Formulae.** J. C. King. *Aircraft Engineering*, v. 16, Feb. '44, pp. 32-37, 49.
Strain gauges used in the aircraft industry as a means of assessing the loads in aircraft structures, both in structural testing laboratories and in flight.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-5. **Survey of Liquid Steel Temperatures in Basic Open-Hearth Furnaces.** D. Manterfield. *Metallurgia*, v. 29, Jan. '44, pp. 141-144.
Details are given of the type of furnace and slag dealt with in the survey. The second part concerns the temperature fluctuations during the progress of a heat. The uniformity of temperature in the bath is shown to be governed by its activity.

13-6. **Control Equipments for Induction Heating.** F. E. Ackley. *General Electric Review*, v. 47, March '44, pp. 16-21.
Modern control equipments for both core and coreless types of induction furnaces.

13-7. **Furnace Control Operated from the Load Temperature.** O. G. Pamely-Evans. *Metallurgia*, v. 29, Feb. '44, pp. 171-175.
The trend towards lower furnace temperature, as close as possible to the actual temperature required in the metal, necessitates closer operating control of the furnace, and while many factors must be considered in achieving uniformity in heating, the load temperature is the primary consideration. Using the radiant tube furnace as a basis, the author discusses control of the furnace operated from the load temperature.

14. FOUNDRY PRACTICE AND APPLIANCES

14-72. **Use of Cement in Foundry Moulding.** C. A. Sleicher. *Foundry Trade Journal*, v. 72, Jan. 20, '44, pp. 55-56, 58.
Radical differences between American and British practice.

14-73. **Notes on Oil-Sand Practice in the Ordinary Foundry.** Wm. Y. Buchanan. *Foundry Trade Journal*, v. 72, Jan. 21, '44, pp. 53-54.
Secondary air for core ovens.

14-74. **Continuous Casting.** Leslie H. Day. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 233-238, 267.
Finished and semi-finished strip and sheet, ferrous and non-ferrous, produced straight from molten metal, eliminates the ingot and re-rolling stages. Similar processes for continuously casting bars and tubes on the same principle are already operating in other countries.

14-75. **A Technical Department for Large Foundries Producing Small and Medium Castings.** H. Hayden. *Foundry Trade Journal*, v. 72, Jan. 20, '44, pp. 47-51.
Essential factors for insuring regularity in production.

14-76. **Effect of Casting Conditions on the Properties of a Magnesium Die-casting Alloy.** W. R. D. Jones. *Engineers' Digest*, v. 1, Feb., '44, pp. 164.
Effects of tapered mold and group casting molds outlined and variation in amounts of alloying substance. Influence exerted by superheating temperature and microporosity.

(Continued on page 6)

Metal Literature Review

14. FOUNDRY PRACTICE

(*Continued from page 5*)

14-77. Development of the Pressure Die-Casting Industry. H. Skelding. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 249-254.

With the large increase in the demand for Zn over the last few years, some manufacturers have undertaken production without the requisite knowledge or skill with the result that some users, having been supplied with an inferior product, have condemned the process generally. Deals with some of the difficulties encountered in production of Zn-base die castings and gives guidance to manufacturers and users alike.

14-78. Molds Laundry Machinery Castings. Pat Dwyer. *Foundry*, v. 72, March '44, pp. 100-102, 162.

Description of American Laundry Machinery Co., Rochester, N. Y.

14-79. Structure Control of Gray Cast Iron. R. G. McElwee and Tom E. Barlow. *Foundry*, v. 72, March '44, pp. 104-105, 163-164.

Choice of inoculant, amount to use, methods of adding it, and use in correcting analysis.

14-80. Makes the Most of Floor Space. Pat Dwyer. *Foundry*, v. 72, March '44, pp. 107-108, 179-181.

St. Louis Steel Casting Co., where monthly production of small and medium size steel castings has been raised from 175 to 550 tons.

14-81. Factors in the Production of Quality Castings. William G. Reichert. *Foundry*, v. 72, March, '44, pp. 114-115, 190-195.

Causes and methods of correcting internal shrinkage and sponginess in castings, and explains the effect of different gating systems on metal solidification during the freezing process.

14-82. Casting in Plaster Molds. Fred Chambers. *Foundry*, v. 72, March '44, pp. 98-99, 183-186.

Advantages of using plaster molds. Castings are smoother than sand castings and require less machining. Due to slower cooling of the metal, better grain growth results and better physical properties are achieved in copper and magnesium alloys. As the plaster molds and cores are soft they do not prevent shrinkage of the metal on cooling. Any restriction of this natural shrinkage sets up strains or fine cracks in the casting.

14-83. Castings Are a Front-Line War Material. Alex Douglas. *American Foundryman*, v. 6, March '44, pp. 9-12.

The foundry's responsibility in producing sound castings, manufactured to government specifications. Advocates the formation of a committee to serve as a "clinic" where foundrymen may feel free to present problems relating to the production of castings, and receive unbiased practical advice for overcoming difficulties peculiar to their methods of operation.

14-84. A.F.A. Subcommittee on Sintering Test Reports. *American Foundryman*, v. 6, March '44, pp. 2-4.

Definitions of sintering discussed, effect of time, mechanism of adhering sand in iron practice, causes of penetration, simple visual examination.

14-85. Skin Drying Molds with Infra-red Lamps. H. B. Voorhees. *American Foundryman*, v. 6, March '44, pp. 13-14.

The practice of skin drying molds by a simplified adaptation of infra-red lamps solved the problems of a foundry, where the quantity of orders did not justify installation of extensive drying equipment. This drying method was originally adopted as an economy measure and space saver.

14-86. Magnesium Foundry Technique. Ian Ross. *Foundry Trade Journal*, v. 72, Feb. 3, '44, pp. 89-92, 99.

A description of the manufacture of what is probably the largest casting made under quantity production conditions.

14-87. Wartime Foundry Raw Materials. *Foundry Trade Journal*, v. 72, Feb. 3, '44, pp. 97-98, 99.

How shortages are being overcome.

14-88. Canadian Practice for the Casting of Non-Ferrous Test Bars. *Foundry Trade Journal*, v. 72, Jan. 27, '44, pp. 78-79.

Tentative specification for non-ferrous test pieces.

14-89. High-Duty Iron Castings. E. Morgan. *Foundry Trade Journal*, v. 72, Jan. 27, '44, pp. 67-73.

Discussion of the new technique from various practical aspects with special reference to high-phosphorus and refined irons.

14-90. Notes on Oil-Sand Practice in the Ordinary Foundry. Wm. Y. Buchanan. *Foundry Trade Journal*, v. 72, Jan. 27, '44, pp. 75-76.

For certain repetition jobs stack moulding can show savings.

14-91. Notes on Oil-Sand Practice in the Ordinary Foundry. Wm. Y. Buchanan. *Foundry Trade Journal*, v. 72, Feb. 3, '44, pp. 93-96.

Advantages of stack moulding, followed by a warning as to oil-sand reclamation.

14-92. Light Alloy Foundry Technique. *Aircraft Production*, v. 6, Feb. '44, pp. 55-58.

Manufacture and use of metal patterns; cores and moulds.

14-93. War Producer Selects "Lost Wax" Casting Process for Complicated Parts. W. E. Ruder. *American Machinist*, v. 88, March 2, '44, pp. 94-96.

Through development of a suitable mold material and electrically controlled wax-injection machines, an old art becomes a production process for making intricate parts requiring little or no machining.

14-94. Drop Hammer Dies Made from Cerrobend. *Iron Age*, v. 153, March 2, '44, p. 45.

Dies for protype and sample parts are being made from Cerrobend metal cast from plaster patterns in the Detroit and Los Angeles plants of the Castoloy Corp.

14-95. Better Copper Alloy Castings. H. E. McGowan. *Iron Age*, v. 153, March 2, '44, pp. 50-52.

Good castings of uniform quality are the result of the combination of correct furnace construction, controlled combustion, proper sand specification and shakeout time. In this talk before the Los Angeles Chapter of the American Foundrymen's Association the author discusses the necessary controls for a copper alloy foundry.

(Continued on page 7)

Comments on Literature Review Indicate Widespread Acclamation

UNQUALIFIED AND WIDESPREAD approval has been given the new "Review of Current Metal Literature," the third monthly installment of which appears in this issue, starting on page 2. Members of the American Society for Metals and readers of THE REVIEW have been unreserved in their praise of this new undertaking.

The following excerpts from the many letters received from engineers and executives in the metal industry are only a small sample of the approbation expressed.

Please accept my sincerest compliments for your efforts in inaugurating a new service to all metallurgists and me personally. The annotated survey of technical literature will afford me with a simplified, direct and practical means of reading literature of specific interest to me without exhaustive and time-consuming research through all the different technical magazines edited in this country. . . .

I have noted with pleased surprise the new format—the obvious effort to include articles of maximum interest to THE REVIEW readers, but particularly I note "The Review of Current Literature." This seems to be a colossal undertaking and must have been a subject of considerable discussion before it was undertaken.

The value of it ought to be correspondingly great. I cannot say what others think about it, but for my own part I have considered it so important that I am calling attention to all of the men in the Research Division of this Laboratory to it with the suggestion that each section head instruct his stenographer to copy on file index cards those items that pertain to his individual work. In addition, I have discussed the use of this material with our librarian and she will circulate a memorandum to all divisions and sections of the Laboratory calling attention to the material and informing them that a copy will be available in the library for general use.

I wish to congratulate you on the concept of this service, to express my personal appreciation and the thanks of the Research Division of this Laboratory for providing this excellent source of reference literature. . . .

Congratulations are due you and the staffs of A.S.M. and Battelle Memorial Institute for making these abstracts available to the membership of A.S.M. . . . My best wishes to you on the success of this new feature. . . .

I would like to extend my congratulations for your astute work in this connection. The service should prove of great value to all the members, and I shall follow it with interest. . . .

"The Review of Current Metal Literature" has received a great deal of favorable comment from members of our group. Some of the men are cutting out the various items and pasting them in notebooks for future reference. . . . I believe this is a very worthy addition to the A.S.M. list of publications, and that you will receive many favorable comments. If you have not considered the issuance in book form, I, for one, would suggest that it be given very serious thought. . . .

The Review of Current Metal Literature is an excellent idea and serves a very useful purpose by providing a complete up-to-date survey of metal literature. I think this is another step forward in the American Society for Metals' program for helping its members. . . .

I believe that I cannot be too high in my praise for the new literature survey which was started in THE REVIEW. I especially like the way in which the articles are grouped, as these are very easily referred to and comprehensive enough for determining their value. . . .

I am sure it will be useful to many of your members—and to libraries in general which do much in metallurgical research information. I was particularly pleased to see that it is printed so that the items can be clipped for filing purposes. . . .

The new literature survey has been received very favorably by every member to whom I have talked. Everyone is agreed that such a survey was badly needed in this country and that you have done the membership a great service by providing it. . . . I am sure there is nothing the Society could have done which would have been of more value to its members. . . .

I want to congratulate you on this progressive step. For those of us who do not have an opportunity to see many of the publications, this service can be of the greatest value, and we propose to use it to the full. . . .

Your new service of surveying current metal literature is undoubtedly one of the best I have ever seen. . . .

Krivobok Joins Research Staff Of International Nickel Co.

V. N. Krivobok, recognized authority on stainless steel and a national trustee of the American Society for Metals, has become associated with the Development and Research Division of the International Nickel Co. at New York. Dr. Krivobok's services will be utilized mainly in the development of markets for alloy and stainless steels and to assist steel manufacturers in expanding markets for their postwar products.

V. N. Krivobok

Dr. Krivibok had until recently been chief metallurgist of the Lockheed Aircraft Corp. at Burbank, Calif. Before joining Lockheed in 1941 he was professor of metallurgy at Carnegie Institute of Technology, while also serving as associate director of research for the Allegheny Ludlum Steel Corp. (1934-1940). From 1924 to 1934 he had been consulting metallurgist to several steel companies.

A graduate of Harvard Engineering School, Dr. Krivobok's many papers on stainless and other alloy steel have been widely published. One of his best known papers, "Alloys of Iron and Cromium," he presented in October, 1934, as the ninth Edward de Mille Campbell Memorial Lecture of the A.S.M.

Function of Alloys in Aluminum, Heat Treatment, Applications Given

Reported by Ralph Winship
Columbia Steel Co.

Puget Sound Chapter—Roy E. Paine, chief works metallurgist, Vernon Works of Aluminum Co. of America, described the common and important alloys of aluminum at the regular meeting on Feb. 16. The function of each of the alloying elements in the various aluminum alloys for wrought and cast products was discussed in detail.

Thermal treatment for aluminum alloy wrought products and the factors which must be controlled in order to effect correct thermal treatments were pointed out. The applications to which aluminum has been put in the past were described and a discussion of the applications to be expected in the future was presented.

At the conclusion of Mr. Paine's talk the audience put a considerable number of questions regarding various technical phases of the aluminum alloys.

Ontario Chapter Honors Seven Past Chairmen

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

Ontario Chapter paid tribute to the past chairmen from the Hamilton district at a meeting in Hamilton on March 3, by presenting them with suitably engraved and framed certificates. The past chairmen receiving certificates were: Hugh Davis, International Harvester Co. of Canada, Ltd.; Charles H. Mitchell, Canadian Westinghouse Co., Ltd.; A. Oram, Burlington Steel Co., Ltd.; Harold Chambers, Atlas Steels, Ltd.; Neil Metcalfe, Burlington Steel Co., Ltd.; and Harry Thomasson, Canadian Westinghouse Co., Ltd. Seventh past chairman, F. A. Looseley, Dominion Foundries and Steel, Ltd., received a certificate in absentia.

"Magnesium and Its Alloys" was the subject of the technical address by J. D. Hanawalt, director of the metallurgical department, Dow Chemical Co. In outlining the various production methods Dr. Hanawalt stated that the principal differences in electrolytic processes are in the raw materials used and the methods employed in processing the magnesium chloride.

The ferrosilicon process was said to be simple chemically and to have the advantage of requiring very little electric power where a suitable fuel, such as gas, is available for heating retorts. Other processes include calcium carbide reduction, and carbon reduction with quenching of magnesium vapor in cold hydrogen or natural gas.

The speaker referred briefly to the fabrication of magnesium alloys into useful articles by casting, rolling and other methods. The crystal deformation characteristics of magnesium explain its limited capacity for drawing, bending, spinning, and related operations at room temperature. However, there are some advantages to hot-forming operations, since the work can be done in one draw which would require several draws in any metal if done cold.

In design, magnesium alloys have the outstanding advantage of light weight and of permitting members of greatly increased stiffness when aluminum or steel is replaced with an equal weight of magnesium alloys. In redesigning a component, such as a section of an aircraft, in magnesium alloys, there are two basic principles which may be applied. The first of these is to use the same design as employed in other metals, endeavoring to save weight wherever possible. The second method of approach is to go to monocoque construction for economy, simplicity and low labor costs.

Metal Literature Review

14. FOUNDRY PRACTICE

(*Continued from page 6*)

14-96. Continuous Casting of Metals; The Williams Process. Edward R. Williams. *steel*, v. 114, March 6, '44, pp. 140-141.

Advantages of this process especially in casting steel ingots include elimination of rough forming and breakdown rolling operations; practically 100% ingot yield of the metal poured; reduction in ingot surface imperfections; elimination of segregation and improvement of internal ingot quality; metallurgical control of grain size and structure by regulation of cooling speed; and reduction in invested capital per ton of metal cast and rolled.

14-97. The Goss Process. Norman P. Goss. *Steel*, v. 114, March 6, '44, pp. 141-142, 174-178.

Graphite serves many purposes, mold slots permit changes, casting requirements, origin of surface wrinkles, mechanism of solidification, smooth surface prevents sticking.

14-98. Wood Dust in Moulding Sand. *Iron & Steel*, v. 17, Feb. '44, p. 242.

Wood dust of suitable types can be used satisfactorily as a substitute (either in part or completely) for coal dust for most light and medium weight iron castings. Wood dust has been used satisfactorily in both synthetic and natural bonded sands, both as a facing and in a continuous sand system, for several months on production castings. Proportion of wood dust used. Type of wood dust. Influence on sand properties. Effect on castings.

14-99. Phosphorus Is Serving—on Countless Fronts. W. O. McMahon. *Pig Iron Rough Notes*, no. 96, Winter, pp. 27-30.

Value of phosphorus in gray iron castings.

14-100. Engineered Cast Iron. C. H. Morken. *Pig Iron Rough Notes*, no. 96, Winter, pp. 5-10.

Effect of nickel, chromium, molybdenum as alloying elements and uses of respective cast irons, chill test by sand cast step, bar method recommended. Inoculation. Effects.

14-101. The Cupola Sand Bottom. C. S. Whittet. *Pig Iron Rough Notes*, no. 96, Winter, pp. 13-15, 18.

Cupola preparation; refractories for sand bottoms and possibilities of failure of the latter set forth.

14-102. A Method For Planning Foundry Production. Ecossais. *Foundry Trade Journal*, v. 72, Feb. 10, '44, pp. 125-126.

Keeping track of orders and patterns and indicating spare capacity.

14-103. Magnesium Foundry Technique. Ian Ross. *Foundry Trade Journal*, v. 72, Feb. 10, '44, pp. 121-124.

Coreing up, cleaning, finishing and inspection of a large magnesium casting.

14-104. Some Aspects of Sand Control. F. Thomas. *Foundry Trade Journal*, v. 72, Feb. 10, '44, pp. 113-119.

Sand control in a steel foundry is a sound investment, being simple in application and giving good clean and sound castings.

14-105. The Maintenance of Die Casting Dies. H. K. Barton. *Machinery* (London), v. 63, Dec. 30, '43, pp. 750-752.

Systematic check on the condition of dies. System of checking, cover for wastage, office records.

14-106. Why Die Casting? *Die Casting*, v. 2, no. 3, March '44, pp. 36-37.

Reproducing detail, easy finishing, combining with other parts and fastening.

14-107. Die Castings Replace Fabricated Sheet Metal Assemblies in Aircraft Work. *Die Casting*, v. 2, no. 3, March '44, pp. 15-17.

Improved casting technique, new alloys and positive controls have made die castings, with their many important advantages over formed sheet metal structures, available for extensive use in speeding up production of war planes. The experience of one producer, the Airplane Division of Curtiss-Wright Corp. in Buffalo, is discussed.

14-108. Founding in Aircraft Construction. *Light Metals*, v. 7, March '44, pp. 125-126.

Abstract of, and critical commentary upon, a recent French publication reviewing foundry techniques for aluminum and magnesium.

14-109. Test-Bars for Bronze Castings. W. A. Baker. *Foundry Trade Journal*, v. 72, Feb. 24, '44, pp. 155-159, 163.

A plea for nationally standardized test-bars.

14-110. Producing Sound Magnesium Castings. J. Haywood. *Foundry Trade Journal*, v. 72, Feb. 24, '44, pp. 161-164.

Flux inclusions. Porosity and gating systems are discussed.

14-111. Magnesium Casting Production. *Aircraft Production*, v. 6, March '44, pp. 145-148.

Chevrolet Foundry processes for Pratt and Whitney engine components. Core-making, molds, pouring, fettling.

14-112. Light Alloy Castings. *Aircraft Production*, v. 6, March '44, pp. 131-136.

The light alloy foundry of Thomas Firth and John Brown, Ltd. Gravity die casting the Avro Lancaster undercarriage support beam.

15. SECONDARY METALS

15-7. Practical Methods of Segregating Steel Swarf. *Engineers' Digest*, v. 1, Feb. '44, pp. 148-149.

Organization, identifying the material, marking the machine, clearing the machines, crushing the swarf, reclaiming the oil from the swarf.

15-8. Utilizing Alloy Steel Scrap. Victor E. Zang. *Foundry*, v. 72, March '44, pp. 113, 134.

Ferrous Industry Advisory Committee of the War Production Board recently received this report of a series of tests run by one foundry in an effort to increase the use of alloy steel scrap.

15-9. Brass Cartridge Scrap. *Chemical Age*, v. 50, Jan. 1, '44, pp. 15-16.

An aid in copper conservation.

15-10. Chip-Disposal Methods. Frank J. Oliver. *Mechanical Engineering*, v. 66, March '44, pp. 163-168.

Scrap segregation, material handling, crushing the turnings, making briquettes, European methods of salvage.

Boston Hears Grossmann on Roberts-Austen Anniversary

Reported by L. Geerts
Republic Steel Corp.

Boston Chapter—A hearty welcome for one of Boston's own was extended to the speaker on March 3, National President Marcus A. Grossmann. Although born in Youngstown, Ohio, Dr. Grossmann was graduated from Massachusetts Institute of Technology in 1911 and received his Ph.D. under Albert Sauveur at Harvard University in 1931.

The technical talk, "Hardenability of Steel and Effects of Alloys," discussed in detail the ways in

Chairman Jim Baxter (Left) Introduces National President Grossmann to the Boston Chapter (Photo by H. E. Handy)

which hardenability is measured and the effects of various alloys on hardenability. By coincidence, this excellent talk commemorated the birthday of Sir William Roberts-Austen, the originator of the iron-carbon diagram. Born 101 years ago on March 3, this distinguished English metallurgist received further distinction by having the structure austenite named for him.

Vice-Chairman John T. Norton ably served as chairman and closed a most successful meeting with the showing of two motion pictures of Uncle Sam's fighting planes.

Wright Whirlwind Crankshaft Traced From Raw Material to Assembly

Reported by Stewart M. DePoy
Metallurgist, Delco Products Div., G.M.C.

Dayton Chapter—A. J. Pepin, chief metallurgist of Wyman-Gordon Co., gave a lecture on March 8 on "The Production and Heat Treatment of Aircraft Forgings" that was undoubtedly the most comprehensive one ever given on forging at the Dayton Chapter.

Mr. Pepin traced the Wright Whirlwind crankshaft all the way through from the selection of material to the finished assembly. He stressed the importance of metallurgical control prior to forging, and the necessity of magnetic and other forms of inspection after forging.

In addition to illustrative slides, Mr. Pepin presented two movie films, one on the actual forging at the Worcester plant of Wyman-Gordon, and one taken at the Naval Training Base, Quonset Point, R. I. The latter movie revealed the important part that Wyman-Gordon forgings play in the aircraft power plant.

Forging and Welding Will Replace Castings, Plant Manager Predicts

Reported by James C. Erickson
John Deere Plow Works of Deere & Co.

Tri-City Chapter—In the future, forging and welding will largely replace castings. That was the prediction of Elmer Isgren, plant manager, R. G. Le Tourneau, Inc., Peoria, Ill., the speaker at the February meeting. The title of Mr. Isgren's address was "Fabrication by Arc Welding".

The speaker stated that at his plant fabrication is done by welding wherever possible. His lecture was illustrated by a number of lantern slides showing welding jigs and welded fabricated parts. Of considerable interest were slides showing a number of jigs used for welding scrapers measuring 6x16 ft. These jigs were deliberately bowed to counteract distortion resulting from welding.

Before the regular technical session was begun, two motion pictures entitled, "U. S. Marines Capture Tarawa" and "A Man, a Dog, and a Gun," were shown.

Watson With Office of Civilian Requirements

J. M. (Mike) Watson, past president A.S.M., who has been metallurgist with the Tank Automotive Center in Detroit, has returned to Washington to take charge of the Steel Division of the Metals and Minerals Branch of the Office of Civilian Requirements.

Metal Literature Review

15-11. Non-Ferrous Secondary Metals. F. H. Wright. *Mining Congress Journal*, v. 30, Feb. '44, pp. 92-93.

Non-ferrous metals supply sustained by all-out salvage drive.

15-12. Iron and Steel Scrap. Harold E. Carmony and L. Cullen. *Mining Congress Journal*, v. 30, Feb. '44, pp. 93-94.

Iron and steel scrap industry duplicates previous record performance.

15-13. How to Smelt Battery-Plate Scrap. Carle R. Hayward. *Engineering & Mining Journal*, v. 145, March '44, pp. 80-83.

Methods used; softening; flux ration, and reduction; furnace corrosion.

15-14. Secondary Aluminum in War. R. J. Priestman. *Metallurgia*, v. 29, Feb. '44, pp. 197-199.

The recovery of scrap and wastes, and their use with, or instead of, metals produced from ores, is sound economics, and entirely in accord with the general principle of conserving natural resources. This is true of aluminum scrap, as of other forms of scrap, from which secondary aluminum is produced, and which has contributed to the expanding aluminum requirements imposed by war. The author outlines the production of this important source of supply and stresses the control facilities by which the standard is maintained.

16. FURNACES AND FUELS

16-28. The Modern Arc Furnace. T. J. Ess. *Iron & Steel Engineer*, v. 21, Feb. '44, pp. 7-Af-38-Af, Af-41, 44-Af-46-Af, Af-49, Af-53, Af-55, 58-Af.

Summary of the modern arc furnace and ingot production.

16-29. Conservation of Resources. E. S. Grumell. *Engineering*, v. 157, Jan. 21, '44, pp. 55-56.

Relative values of different sizes, qualities and types of coal and coke.

16-30. Blast Furnace Moisture Control. J. J. Alexander. *Iron & Steel Engineer*, v. 21, Feb. '44, pp. 38-41.

Although considered insufficient to be conclusive, data obtained from this test indicate a more uniform silicon in the iron, an increased metallurgical efficiency, somewhat greater production, with possibly lower coke and limestone consumption.

16-31. A Unified System of Boiler Control. *Engineers' Digest*, v. 1, Feb. '44, pp. 151-152.

Recent development in bringing the operation of industrial works boilers into line with modern power station practice—adaptation of the unified system of combustion control.

16-32. Computation of Steam Boilers by a Graphical Method. Th. Geissler. *Engineers' Digest*, v. 1, Feb. '44, pp. 155-157.

Explanation of a graphical method of steam boiler computation.

16-33. The Heating of Open-Hearth Furnaces with Mixed Coke-Oven and Blast-Furnace Gas. R. W. Evans. *Metallurgia*, v. 29, Jan. '44, pp. 125-133.

The author is of the opinion that the best method of firing open-hearth furnaces is to use cold coke-oven gas and tar, tar-oil or pitch, particularly where the very high metallurgical loads which have to be carried require tilting rather than fixed furnaces and where the coke-oven gas is likely to be lean. Flame development; the role of the flame slag foams, their reaction on furnace output and wear; the development of luminosity in coke-oven and blast-furnace gas flames; furnace design; and some metallurgical aspects resulting from the use of mixed gas are discussed.

16-34. The Suitability of War-Time Coals for Use in Gas Producers. W. D. Vint. *Metallurgia*, v. 29, Jan. '44, pp. 152-154.

Differences in the raw materials that the iron and steel industry used have created many problems; even coal supplies have caused difficulties, and since coal, whether in the form of coke or gas, is the source of heat, the importance of suitable types of coal cannot be over-estimated.

16-35. Electronic Processing of Plastic Bonded Molded Plywood. *Aero Digest*, v. 44, Feb. 15, '44, pp. 104, 106, 108, 132, 136, 139, 141.

How "Duramold" is making use of high frequency methods to solve problem of providing uniform heat to glue lines in laminated wood.

16-36. H. F. Electrothermics in the Technology of Light Metals. B. J. Branjnikoff. *Light Metals*, v. 7, Feb. '44, pp. 55-61.

A description of a condenser furnace and details of high-frequency furnace design.

16-37. Merits of Salt Baths and Air Furnaces. James Snider. *Automotive & Aviation Industries*, v. 90, March 1, '44, pp. 40-41, 50.

Formed parts can be more efficiently processed in salt baths. Small parts can be handled to advantage in air furnaces. Alloys such as 14S and 17S which are heat treated at different temperatures from 920° F. which is our salt bath operating temperature, are heat treated in air furnaces.

16-38. Fuel Conservation Opportunities in Industrial Buildings. Davis M. De Bard. *Industry & Power*, v. 46, March '44, p. 79.

With fuel and manpower becoming more scarce as the war progresses, engineers responsible for heating and ventilating industrial buildings are in a position to assist in the conservation of these resources.

16-39. Fuel and Metallurgical Furnaces. R. Whitfield. *Iron & Steel*, v. 17, Feb. '44, pp. 269-274.

Fuel economy.

16-40. Gas Cleaning. *Iron & Steel*, v. 17, Feb. '44, pp. 247-249.

Single- and two-stage electroprecipitator units for blast furnaces.

16-41. Charcoal Pig Iron Project at Rusk, Texas. Ralph H. Sweetser. *Mining & Metallurgy*, v. 25, March '44, p. 155.

Reconstruction of Pembroke blast furnace and idle charcoal by-products plant of Delta Chemical & Iron Co. at Rusk.

16-42. Development of Electric Heating for the Wire Industry. A. E. Bellis. *Wire & Wire Products*, v. 19, March '44, pp. 174-175, 192-194.

The salt-bath furnace has undergone many refinements that have brought it to a high operating efficiency. Some of these developments outlined.

(Continued on page 8)

Metal Literature Review

16. FURNACES AND FUELS

(Continued from page 7)

16-43. Basic Practice Development in the Electric Arc Furnace. Harry F. Walther. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 334-341.
Brief historical sketch of electric arc furnace; melting procedure control: bottom requisites; melting and oxidizing; power efficiency.

16-44. Coke for Metallurgical Purposes. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 359-362.
Description of coke ovens; properties of coals used.

16-45. The Primary Heat Problem of Electric Furnace Design. Victor Paschkis. *Industrial Heating*, v. 11, March '44, pp. 362-364, 366, 368.
Heat flow problems inherent in industrial electric furnaces.

16-46. Fuel Proportioning and Temperature Control Applied to Forge Furnaces. *Industrial Heating*, v. 11, March '44, pp. 378, 380, 382, 384, 386.
Proportioning control; forging furnace design, pusher furnaces; burner plates and blocks, other furnaces; heat treatment.

16-47. Many Uses Developed for Induction and Dielectric Heating. *Industrial Heating*, v. 11, March '44, pp. 401-402.
Brazing propeller blades, carbide-facing oil-well drill bits, soldering operations, smoothing plastic sheets, dielectric heating.

16-48. Mixed Coke-Oven and Blast-Furnace Gas for Open Hearths. *Industrial Heating*, v. 11, March '44, pp. 416, 460.
Flame development when using mixed coke-oven and blast-furnace gas as open hearth fuel. Iron & Steel Institute Paper.

17. REFRACTORIES AND FURNACE MATERIALS

17-12. Lagging for Heat Conservation. *Iron & Steel*, v. 17, Feb. '44, p. 254.
Theory and application of insulating materials.

17-13. Conserve Vital Fuel by Insulating Bare Metal Surfaces. *Industry & Power*, v. 46, March '44, pp. 72-75.
Methods of calculating and reducing preventable heat losses are illustrated by typical examples of savings derived from insulating feedwater heaters, hot storage tanks, boiler drum heads, piping, and fittings with mineral wool insulation. Other types of insulation will produce similar savings.

17-14. Industrial Survey of Refractory Service Conditions in Electric Steel Furnaces. *Industrial Heating*, v. 11, March '44, pp. 448, 452, 454.
Design and operational details relative to electric furnaces which affect the life in service of refractories used in their lining and construction. The two main types of electric furnaces in common use for the manufacture of steel are described, along with their auxiliaries. Methods of installation of refractories for this service are also discussed.

18. HEAT TREATMENT

18-45. The Sulphur Content of Carburizing Compounds in Electric Carburizing Furnace Operation. K. Wohlgemuth. *Engineers' Digest*, v. 1, Feb. '44, pp. 167-168.
Effects of the sulphur contents of the carburizing compounds upon the electrical heating elements.

18-46. Notes on the Heat Treatment of Gray Cast Iron. M. Bader. *Engineers' Digest*, v. 1, Feb. '44, pp. 165-167.
Discussion of the most commonly applied methods of heat treatment: Stress-relief anneal; soft anneal; hardening and tempering; salt-bath hardening; and surface hardening with the oxy-acetylene torch.

18-47. Heat Treating Bronze Castings. J. W. Horner and Frank A. Mason. *Foundry*, v. 72, March '44, pp. 109, 187-189.
Heat treatment to cure porosity is applicable only to a certain condition of the metal structure.

18-48. Nitriding. L. G. Whybrow Palethorpe. *Chemical Age*, v. 50, Jan. 1, '44, pp. 11-14.
Case-hardening steels with nitrogen.

18-49. The Hardening Quench. E. Simister. *Metallurgia*, v. 29, Jan. '44, pp. 115-118.
The theory of quenching and various media employed, with their advantages and disadvantages.

18-50. Heat Treating Cast Iron. J. Edmiston. *Metallurgia*, v. 29, Jan. '44, pp. 138-140.
Iron castings can be made to possess properties that render them capable of withstanding a considerable variety of severe service conditions. When properly produced, under controlled conditions, iron castings can be substantially improved and modern high-duty types react to suitable heat treatment cycles.

18-51. Modern Practice in Surface Hardening. *Metal Progress*, v. 45, March '44, pp. 484-496.
Six brief talks presented at one of the A.S.M. Group Meetings at the October Convention. Covers gas carburizing, hard layers on tool steels, differential hardening.

18-52. Controlled Gas Carburizing and Diffusion Cycles. Floyd E. Harris. *Metal Progress*, v. 45, March '44, pp. 484-486.
Discusses steel analysis; temperature of carburization, elapsed time, composition of gas within the carburizing chamber, rationale of gas usage, diffusion period.

18-53. Supposed "Graphite" in Carburized Cases. John Welchner. *Metal Progress*, v. 45, March '44, pp. 486-487.
Barium energized material produces a much greater grain boundary attack than the calcium energized. Grain boundary substances were formed during the time at carburizing temperature, and were unaffected by the method of cooling. Steel analyses showed that no grain boundary constituent could be produced. Si and Al either promoted graphitization or themselves entered into a chemical reaction during carburizing.

18-54. Utility of the Hardenability Test on Steels for Carburizing. O. W. McMullan. *Metal Progress*, v. 45, March '44, pp. 490-492.
Case and core considered separately in connection with Jominy end-quench test.

18-55. Differential Hardening with High Frequency Current. F. F. Vaughn. *Metal Progress*, v. 45, March '44, pp. 493-494.
Principles, practice and applications.

(Continued on page 9)

Cast Iron Old in Use, New in Understanding Mahin Tells Chapter

Reported by A. S. Coffinberry
University of Notre Dame

Notre Dame Chapter—In its utilization in engineering practice cast iron is both an old and a new material. According to W. E. Mahin, in charge of metallurgical engineering at the East Pittsburgh Works of Westinghouse Electric and Mfg. Co., it is one of the oldest of alloys to be used by man and one of the newest to be understood by him. Mr. Mahin addressed a February joint meeting with the Michiana Chapter of the American Foundrymen's Association on the subject, "Cast Iron as an Engineering Material."


W. E. Mahin

Despite its early use, cast iron's complexity of composition, structure, and properties has caused an accurate understanding of this alloy to lag behind the more rapidly advancing clarification of the mysteries of steel. Only recently have modern concepts of physical metallurgy begun to be extended and adapted to an equally scientific investigation of the problems and possibilities of gray cast iron. Revealed by this new light, manifold aspects of the true nature of cast iron have widened its range of specialized applications as determined by specialized properties.

Late Silicon Additions Facilitate Control

A particularly important development has been the use of ferrosilicon additions at the cupola spout, and the wedge test to indicate their effect on depth of chill. These late silicon additions enable control of properties in sections of varying thickness to give more uniform hardness, and make tensile strength a predictable function of carbon equivalent (total carbon plus three tenths of total silicon).

The dependence of gray iron properties on microstructure involves graphite flake size and type, and austenite grain size as well. Small increases in graphite size number (smaller flakes) tend to cause quite large increases in tensile strength if type A graphite is present. Eutectiform or type B graphite, as designated by R. R. Adams, results in lower strengths even if flake size is small.

Probably the most interesting portion of Mr. Mahin's talk was his presentation of examples to illustrate the widening range of cast iron applications. One such example, circulated through the audience for examination, was an electrical resistor grid, cast from ordinary gray iron but designed in such a way as to possess a startling flexibility.

Huge Bearing for Power Units

A cast iron thrust bearing to support the combined weight of a generator rotor and connected water wheel is an engineering development in the huge new hydro-electric power units. Changes in casting practice were required to insure uniformly fine flake size, obtained by fast cooling with a chill, throughout an annular bearing surface as much as 100 in. in diameter. To avoid seizing by the babbitt shoes which move over this surface it was found necessary to polish to exact flatness without removal of any graphite flakes.

To accomplish this demanded not only careful control of graphite structure in casting but the development of a special lapping technique. Whatever failures occurred were found to be caused, not by poor cast iron, but by poor surface finish.

The importance of controlled slow cooling rates after casting or stress-relief annealing was spectacularly exemplified by the 190,000-lb. base for a steam turbine. Applications of special techniques to solve special problems in the quantity production of smaller parts were illustrated by motor frames, and by cast iron molds which were used to manufacture a total of seven million plastic helmets.

Finkl Opens Los Angeles Subsidiary

A. Finkl & Sons Co., Chicago, announces the formation of a subsidiary company, Finkl Steel Products Corp. of Calif., to sell and warehouse Finkl die blocks, hot work steels and other products in the Pacific Coast area. The new company has offices at 900 Santa Fe Ave., Los Angeles, and warehouse at 2116 Bay St.

Silicon Impregnation Is Enthralling Story

Reported by D. M. Horner
Production Manager, Harrisburg Steel Corp.

York Chapter—The development of silicon impregnation of iron and steel and the greater life it imparts to metal in fighting corrosion and wear was the enthralling story told by Harry K. Ihrig, director of laboratories, Globe Steel Tubes Co., at the meeting on Feb. 9. The process provides protection against water and electrolytic corrosion, against low and high temperature oxidation, and against mechanical wear.

Dr. Ihrig told of the development of cast silicon alloys, which form a thin, adherent silicon dioxide film on the surface. However, such alloys are hard, brittle, not machinable, expensive, and have low tensile strength. In silicon impregnation the corrosion resistant properties of silicon alloys are combined with the strength of carbon steels, thus giving industry a stronger and cheaper material.

14% Silicon in Case

The present method of silicon impregnation of iron and steel consists of heating the piece at 1800° F. from 1½ to 4 hr. in a chamber in intimate contact with silicon carbide, and in an atmosphere containing a small amount of chloride gas. The exact chemical reaction is not known but nascent silicon is released and replaces iron in the article impregnated. The amount of silicon in the case generally runs about 14%. The cost depends upon the size and shape of the article impregnated, but in general is about the same as carburizing and is about one half that of stainless steel.

Siliconization, called "Ihrigizing" by the trade, increases wear resistance up to about 25 times that of carbon cased steel in some applications. Resistance to high temperatures is excellent up to 1400° F.; so also is corrosion resistance in humid atmospheres, salt water and sea air, and the use of silicon impregnated chain for ships and other marine parts is steadily increasing.

Alloy steels do not Ihrigize properly, high sulphur steels leave a porous case, cast iron swells considerably, and high carbon steels are not recommended because the silicon seems to segregate or accumulate a heavy carbon zone beneath the case. Therefore, steels of about 0.20% carbon are generally recommended for the process.

d'Arcambal Solves Machinability Problems

Reported by J. G. Cutton
U. S. Steel Corp. Research Laboratory

New Jersey Chapter—On Feb. 21, some 150 members and guests learned "How to Solve Machinability Problems" from A. H. d'Arcambal, vice-president and consulting metallurgist for the Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn. As most A.S.M. members already know, Mr. d'Arcambal is an outstanding authority on the subject of machinability and an accomplished speaker.

Mr. d'Arcambal stressed the importance of having properly designed tools, made from the best materials, correctly hardened, and also the importance of proper microstructure of the material being cut if maximum efficiency and speed of machining are to be attained. Sintered titanium, tantalum and tungsten carbide are becoming increasingly popular, in part because of the fact that the cost of this material has been reduced more than 90% during the past few years. Some types of high speed steel tools have been found to last twice as long before regrinding if they are properly nitrided. In Mr. d'Arcambal's plant a large number of high speed steel tools, after quenching, are nitrided in such a manner as to have extreme hardness, together with fairly good toughness. Steels up to 400 Brinnell are being machined with these nitrided tools. In the speaker's opinion, chromium plated tools do not last as long as nitrided ones on many jobs.

Many machining problems can be solved by change in tool design, according to Mr. d'Arcambal. The grinding finish on cutting tools is also very important, a great increase in tool life resulting from this high degree of finish on the cutting edges.

The machinability of steels, of course, varies with their microstructure and this is a very important factor to consider, particularly in connection with a new steel or new operation. Some machining difficulties arise because the steel being cut is too soft, and in such a case the difficulty may be eliminated by treating the steel before machining it.

Metal Literature Review—*Continued*

18. HEAT TREATMENT

(*Continued from page 8*)

18-56. Putting Flame Hardening to Work. Gordon T. Williams. *Metal Progress*, v. 45, March '44, pp. 494-496.
Applications, hardenable materials, methods, equipment, costs and limitations.

18-57. Amount of Martensite in Quenched Steel Influences Properties After Tempering. Benjamin F. Shepherd. *Metal Progress*, v. 45, March '44, pp. 503-507.
A chart correlating Jominy end-quench data with cooling speeds, surface and center, for specific quenching conditions, the size of bar that can be completely hardened, and its utility.

18-58. Cycle Annealing. Metallurgicus. *Metal Progress*, v. 45, March '44, pp. 508-509.
Description of annealing cycle, cycle and full annealing compared; operation in batch furnaces.

18-59. Keep Water Out of Fast Quenching Oils. George R. Pease. *Metal Progress*, v. 45, March '44, pp. 511-512.
A few tenths of a per cent of water, finely dispersed in a normally "fast" oil, so reduced the initial quenching speed of the oil that it no longer quenched satisfactorily. Tests results on different oils.

18-60. Speeding Heat Treatment of Aluminum Alloys. S. G. Andrews. *Iron Age*, v. 153, March 9, '44, p. 65.
Soaking time for heat treatment of clad aluminum alloys which is longer than necessary reduces the productive capacity of the ovens and causes diffusion of the copper into the aluminum alclad, and surface blisters.

18-61. Flame Hardening Aircraft Gears. *Iron Age*, v. 153, March 9, '44, pp. 66-67.
Fabrication of gears for retractable landing devices on Army P-39 Airacobras, built by the Bell Aircraft Corp., Buffalo, N. Y., includes a flame-hardening process on gear teeth that permits close control of gear teeth hardness and better quality of the finished product.

18-62. Tool Design Principles Apply to Induction Heating. Frank W. Curtis. *American Machinist*, v. 88, March 16, '44, pp. 91-93.
Fixtures must be devised so they will not be subjected to excessive heating by the high frequency current applied to the workpiece.

18-63. Heating Gears for Hardening by High-Frequency Induction. Frank W. Curtis. *Machinery* (London), v. 64, Feb. 3, '44, pp. 119-124.
Induction heating permits exceptionally fast heating, comparatively low operating cost and uniform results.

18-64. Secondary Hardening of High-speed Steel Cutting Tools. John Garland. *Machinery* (London), v. 64, Jan. 27, '44, pp. 91-94.
Interrupted quenching, primary hardening, secondary hardening, testing for secondary hardness, and testing procedure.

18-65. Induction Heating Serves to Speed Production. M. P. Vore. *Product Engineering*, v. 15, March '44, pp. 182-184.
Basic principles of induction heating and the advantages of its use, including data on typical applications. Depth of penetration, frequency requirements and proper proportioning of heating coils are outlined.

18-66. Increasing Life of High-Speed Steel Tools by Nitriding. *Machinery*, v. 50, no. 7, March 44, pp. 170-175.
Current practice in applying two nitriding processes to high speed steel tool case hardening—the Holden Hy-Speed Case Treatment outlined by General Committee on Metallurgy of General Electric Co., and the "Maxi" process developed by Greenfield Tap & Die Corp.

18-67. Spin Flame Hardening of Ball Races. R. Gilson. *Industry and Welding*, v. 17, no. 3, March '44, pp. 42-45.
Rough machining, followed by heat treatment at 1575°, quenched in oil and air drawn at 1100° F. Internal wall of barrel is broached and flame hardened.

18-68. Advanced Heat Treating Techniques. Robert C. Gibbons. *Steel*, v. 114, March 27, '44, pp. 82-83, 124, 126.
Use of controlled atmosphere continuous furnaces and specially developed induction hardening coils.

18-69. Some Effects of Sub-Zero Cooling on the Tempering of High Speed Steel. G. A. Roberts and J. P. Gill. *Iron Age*, v. 153, March 23, '44, pp. 52-56.
Great attention is now being given to the application of sub-atmospheric treatment of metals, particularly high speed steel. The authors review past work and give data on recent experiments indicating that this treatment has very important commercial applications that will become prominent within the next several years. 4 ref.

18-70. The Application of Hardenability Tests to Carburizing Steels. O. W. McMullan. *Industrial Heating*, v. 11, March '44, pp. 351-352, 354, 356, 358, 360.
General considerations, core properties, relationship between case and core, hardenability tests, hardenability limits, cooling rates, specification ranges, hardenability of case. 4 ref.

18-71. Carburizing and Heat Treating Transmission Parts for Naval and Air Force Equipment. *Industrial Heating*, v. 11, March '44, pp. 370, 372, 374.
Description of equipment built by Pacific Co., Detroit, in use at war plants.

18-72. Heat Treatment Plant. *Aircraft Production*, v. 6, March '44, pp. 122-124.
Recent developments in equipment for the aircraft industry.

18-73. Salt Baths. *Canadian Metals and Metallurgical Industries*, v. 7, March '44, p. 33.
Composition, operation and application to ferrous and non-ferrous metals.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-51. Drawbenches; Their Operation, Uses and Drives. A. L. Thurman. *Steel*, v. 114, Feb. 28, '44, pp. 110, 112, 115, 130-133.
Characteristics of various drives and recommendations for choosing the most efficient type as well as control equipment.

19-52. The "Know-How" of Drawing Aluminum. *American Machinist*, v. 88, March 2, '44, pp. 88-89.
Satisfactory production of drawn aluminum shapes depends upon selecting material of the proper temper to withstand strain hardening, and observing certain simple rules in tool design. Five alloys are commonly used for drawn shapes; 2S, 3S and 52S are hardened only by cold working, but 24S and 61S are heat treatable.

19-53. Drop Hammer Dies for Short Production Runs. *Automotive and Aviation Industries*, v. 90, March 1, '44, pp. 33, 58.
Drop hammer dies are made from a plaster mock-up of the part to be manufactured.

19-54. Use of Forming Rolls in Skin Fabrication. *Aero Digest*, v. 44, Feb. 15, '44, pp. 91-94, 96.
Universal-joint roll drive used. All three rolls are driven. Motor screw-down with independent control provided. Upper roll is located between the two lower rolls to prevent the skin from being pinched.

19-55. Deep Drawing Practice and Technique. Eugene E. James. *Modern Industrial Press*, v. 6, Feb. '44, pp. 37-38, 40.
Design of double action dies; use of Kirksite "A" as die material for draw die for the P-38 droppable tank.

19-56. The Drawing of Fine Uncoated Steel Wire. R. P. Preston. *Modern Industrial Press*, v. 6, Feb. '44, p. 32.
Cleaning after patenting, baking process, lubrication.

19-57. Designing of "Trouble-Free" Dies. C. W. Hinman. *Modern Industrial Press*, v. 6, Feb. '44, pp. 20, 22.
Forged shells, machine trimmed to length and rough finished ready for nosing. Preparation for and description of nosing process.

19-58. Automatic Control of Punch-Press Feed. K. J. Steiner. *Metal Progress*, v. 45, March, '44, p. 510.
Application of a mercury switch has enabled one to hook up a relatively high speed straightener to a punch press requiring a slow supply of straightened strip.

19-59. Accurate Press Work Essential in Making Propeller Spinners. J. B. Alexander. *American Machinist*, v. 88, March 16, '44, pp. 94-96.
Blanking the propeller-blade openings in the "rear" shell of an aluminum spinner gives rise to certain problems in press-tool design and gaging.

19-60. Automatic Forging of 90-Mm. Shells. *Machinery* (London), v. 64, Jan. 27, '44, pp. 95-96.
Clearing automatic shell-forging machine that is an operation at the plant of the General American Transportation Corp., East Chicago.

19-61. The Calculation of Roll Pressure In Hot and Cold Flat Rolling. E. Orowan. *Institution of Mechanical Engineers*, v. 150, Feb., '44, pp. 140-167.
Graphical method for computing, in strip or plate rolling, the distribution of roll pressure over the arc of contact and the quantities derived from this (e.g., the vertical roll force, the torque, and the power consumption). The method avoids all mathematical approximations previously used in the theoretical treatment of rolling, and permits any given variation of the yield stress and of the coefficient of friction along the arc of contact to be taken into account. It can be used in both hot and cold rolling. 16 ref.

19-62. Stretch Forming Aircraft Parts. R. H. Ruud. *Iron Age*, v. 153, March 9, '44, pp. 54-60.
A method of stretching with a die made to the exact shape and contour of the finished part, and includes much valuable data on physical properties of stretched material.

19-63. Light Alloy Pistons. C. Wilson. *Automobile Engineer*, v. 34, Feb. '44, pp. 53-58.
The materials for highly stressed wrought and forged pistons surveyed, and the influence of fabrication methods considered. Individual forging of cast blanks and its relation to grain flow studied and typical test results given. The importance of grain flow is stressed, particularly as it influences the maintenance of a constant quality in the product.

19-64. Making "Spring Grade" Beryllium Copper Wire. F. S. Stickney. *Wire & Wire Products*, v. 19, March '44, pp. 169-172.
Raw material inspection, the "silvercote" process, final inspection.

19-65. Flow of Steel in Upsetter Forging. Arthur F. Macconochie. *Steel*, v. 114, March 13, '44, pp. 90-91, 132.
Manufacture of forgings in the upsetter. The general tendency is to emphasize the original pattern in the bar, and thus to strengthen the finished shell in the lengthwise direction. Strength in the axial direction is particularly important immediately underneath the rotating band, where the section is weakest and least able to resist the pressure of inertia.

19-66. Precision Thread Rolling With Flat and Cylindrical Dies. Holbrook L. Horton. *Machinery*, v. 50, no. 7, March '44, pp. 158-169.
Large quantities of screws and studs are being thread-rolled to meet the exacting standards of the aircraft engine industry. High production, increased tensile strength, and superior surface finish are advantages of this process.

19-67. Jessop Steel Company Puts New 18-in. Mill on Production. Charles Longenecker. *Blast Furnace and Steel Plant*, v. 32, no. 3, March '44, pp. 331-333, 342.
Description of bar mill, billet heating furnaces, and the mill drive.

19-68. A Production Line Method for Making Punch Press Dies. S. W. Bower. *Steel*, v. 114, March 27, '44, pp. 84-85, 128, 130.
Pierce Blank Template is used in the shop as a punch press die for stamping flat parts from aluminum alloy sheet or strip material.

19-69. Deep-Drawing Domes. L. E. Browne. *Steel*, v. 114, March 20, '44, pp. 86-87, 131, 132.
Selection of lubricants, special lubricating mix used; strong caustic cleaners avoided.

19-70. Straightening Light-Alloy Sections. *Aircraft Production*, v. 6, March '44, pp. 107-110.
Special purpose Head-Wrightson stretching and detwisting equipment.

19-71. Pressed Aircraft Pistons. *Aircraft Production*, v. 6, March '44, pp. 139-142.
Heat treatment; laboratory control; advantages of the pressing process.

(Continued on page 10)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	May 15	Engineers Club		
Birmingham Dis.	May 16	Thomas Jefferson Hotel	C. A. Zapffe	Physical Chemistry of Steel Making
Boston	May 5	Hotel Statler	New England Regional Meeting with Boston Post Army Ordnance Assn.	
Buffalo	May 11	Hotel Statler		Annual Meeting
Calumet	May 9	Phil Smidt's Rest., Roby, Ind		Annual Meeting
Chicago	May 17	Chicago Bar Association	Zay Jeffries	Metals in War
Cleveland	May 1	Cleveland Club	E. G. Hill	Steel Melting Practice
Dayton	May 10	Engineers Club	David Harker	Electron Microscope Studies of the Age Hardening of Beryllium Copper
Detroit	May 8	Horace H. Rackham Bldg	Russell Franks	Corrosion Resistant Alloys
Fort Wayne	May 23	Chamber of Commerce		Heat Treatment of Steel
Hartford	May 9		J. O. Almen	Fatigue of Metals
Indianapolis	May 15			Election of Officers
Mahoning Valley	May 2	Y. M. C. A.	M. A. Grossmann	Principles of Heat Treatment
Manitoba	May 11	Marlborough Hotel		Annual Meeting
Milwaukee	May 16	Athletic Club	F. W. Whitcomb	Post-War Use of Sub-Zero Temperatures in Food Preservation
Montreal	May 1	Queen's Hotel	R. J. Anderson	Union Melt Welding
New Haven	May 18	Hotel Garde, New Haven, Conn.	R. H. Harrington	Newer Alloys of the Non-Ferrous Type
New Jersey	May 15	Essex House, Newark	G. K. Scribner	Plastics Versus Metals in Modern Industry
New York	May 8	Bldg. Trade Employers Assoc.	A. A. Schwartz	Induction Heating
North West	May 4	Coffman Memorial Union University of Minnesota		Annual Meeting
Notre Dame	May 10	Engineering Audit., Univ. of Notre Dame	N. K. Koebel	Heat Treatment in Controlled Atmospheres
Ontario	May 5	Hamilton	F. P. Zimmerli	Design, Manufacture and Use of Springs
Ontario	May 19	St. Catherines	G. E. Brumbauch	Tool Steels—Their Use and Misuse
Pittsburgh	May 11	Roosevelt Hotel	L. H. Nelson	Making Electric Furnace Aircraft Steels
Philadelphia	May 26	Engineers Club	D. Volino	Organic Protective Coatings for Metals and Alloys
Rochester	May 8	Powers Hotel		Annual Meeting
Rocky Mountain	May 19	Oxford Hotel		Heat Treating Hints (Motion Picture)
Saginaw Valley	May 16	Dow Audit., Midland, Mich.	J. J. Grebe	Engineering Tools of Tomorrow
Schenectady	May 16	Circle Inn, Lathams, N. Y.	Burgess Johnson	Annual Meeting
Springfield	May 15	Sheraton Hotel		Annual Business Meeting
Syracuse	May 5-6	Onondago Hotel		Two-Day Regional Meeting
Texas	May 23	Houston Country Club	K. R. Van Horn	Officers' Night
Toledo	May 22	Hillcrest Hotel		Forgings
Tri-City	May 9	Hotel Fort Armstrong, Rock Island, Ill.	M. A. Grossmann	Hardenability of Steels and the Effects of Alloys
Tulsa	May 26	Mayo Hotel	Virgil W. Whitmer	Stainless Steel
Washington	May 8	Garden House, Dodge Hotel	Zay Jeffries	Metals for War
West Michigan	May 15	Rowe Hotel, Grand Rapids	A. W. Winston	Magnesium Alloys and Their Application
Worcester	May 10		J. H. Hitchcock	Gear Type Couplings
			C. P. Howard	Steel Cartridge Case Drawing
			E. G. Reising, W. C. Holcomb	Reising Automatic Guns

OTHER IMPORTANT MEETINGS

April 25-28—American Foundrymen's Association. Third War Production Foundry Congress, Buffalo Memorial Auditorium, Buffalo, N. Y.

April 28-29—Society for the Advancement of Management. Drake Hotel, Chicago.

May 1-2—Westinghouse Machine Tool Electrification Forum. Ninth Annual Meeting, William Penn Hotel, Pittsburgh.

May 8—Association of Iron and Steel Engineers. Annual Spring Conference Under the Auspices of the Rolling Mill Committee, William Penn Hotel, Pittsburgh.

May 9-10—American Steel Warehouse Association, Inc. Thirty-Fifth Annual Meeting, Drake Hotel, Chicago.

May 11-13—American Gas Association. Natural Gas Spring Conference, French Lick Springs Hotel, French Lick, Ind.

May 11-12—Society of the Plastic Industry. Annual Meeting, Edgewater Beach Hotel, Chicago.

May 17-18—Society of Automotive Engineers. National Diesel Fuels and Lubricants Meeting, Hotel Knickerbocker, Chicago.

May 17-18—National Metal Trades Association. Annual Meeting, Biltmore Hotel, New York.

May 18-20—Society for Experimental Stress Analysis. Spring Meeting, including a Symposium on Residual Stresses, Their Measurement, and Effects. Hotel Statler, Boston.

May 22-24—American Gear Manufacturers Association. Spring Meeting, Westchester Country Club, Rye, N. Y.

May 25—American Iron and Steel Institute. Fifty-Third General Meeting, Waldorf-Astoria Hotel, New York.

Oct. 16-20—National Metal Congress and War Conference Display. Sponsored by American Society for Metals, Hotel Statler and Public Auditorium, Cleveland.

Theoretical Research Projects Related to Shop Practice

Reported by Ray McBrian
Engineer of Standards and Research
The Denver and Rio Grande Western Railroad Co.

Rocky Mountain Chapter—The technical program at the dinner meeting on Feb. 18 consisted of the A.S.M. film "Metal Crystals" followed by a talk by R. Wayne Parcel, metallurgist of the Denver and Rio Grande Western Railroad, expanding and extrapolating the subjects covered in the film. Mr. Parcel termed it a crusade to show that even the most highly theoretical research projects either are or can be related to shop practices to the betterment of the latter.

Mr. Parcel started with considerations of the properties of the pure elements and covered briefly the rules and considerations governing their effects upon one another. Mentioned were: Density, size and type of unit cell, atomic radius, melting points, and position in the periodic table. It was pointed out that a rough guess could be made as to the type of binary system to be anticipated from a consideration of the above properties of any two elements.

The speaker gave a short resume of the methods of preparing single crystals of a metal, and of the studies which can be made of them. He discussed anisotropy of physical properties, and showed how these properties influence the fabrication of metals, and how they affect the product, especially when a preferred orientation results.

25 Years' Service Represented by 14 Past Chairmen

Cincinnati Chapter Counts Itself Proud to Gather Together So Many Past Chairmen at Its 25th Anniversary. Front row left to right are: Wm. M. Ball, Jr. (1942-43), *T. A. Waltz* (1937-38), *M. H. Brumble* (1940-41), *H. S. Binns* (1929-30), *W. A. Spear* (1919-21), *R. L. Kenyon* (1932-33), *N. Strohmenger* (1936-37). *Standing in the rear, left to right, are: A. J. Smith* (1943-44), *W. P. Woodside* (*A.S.M. founder member, speaker of the evening*), *D. M. Strauchen* (*past chairman, Rochester Chapter*), *E. P. Stenger* (1925-26), *Lt. Col. G. M. Enos* (1928-29), *N. M. Salkover* (1931-32), *Voight Proctor* (1934-35), *George Gerdes* (1941-42), *W. D. Archea* (1935-36), *K. Siems* (1938-39). *Only three were unable to attend—R. O. McDuffie* (1930-31), *J. B. Caine* (1939-40), *and W. R. Klinkicht* (1926-27), *while three others are now deceased—J. C. Hartzell* (1922-25), *A. J. Lucas* (1927-28), *and E. W. Esslinger* (1933-34).

Metal Literature Review

20. MACHINING

20-68. Using Machine Tools to Best Advantage. W. K. Bailey. *Machinery (London)*, v. 64, Jan. 20, '44, pp. 65-68.

Discussion of the rearrangement of work and equipment to reach the necessary production goals without new machines.

20-69. Direct-Current Adjustable-Speed Drives for Machine Tools. G. A. Caldwell. *Machinery (London)*, v. 64, Jan. 20, '44, pp. 69-72.

Description of a self-excited shunt adjustable-voltage drive.

20-70. Reclaiming Carbide Tool Tips. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 262, 265.

Procedure employed at the Aircraft Engine Division of the Ford Motor Company (U. S. A.) for the recovery of tungsten-carbide tool tips.

20-71. Dressing Grinding Wheels Without Diamonds. Von Heinz Frank. *Engineers' Digest*, v. 1, Feb. '44, pp. 176-177.

Description of a dressing tool of a disc especially mounted in a holder.

20-72. A Novel Method for Sharpening Ragged and Knobbling Rolls. O. Rademacher. *Engineers' Digest*, v. 1, Feb. '44, pp. 175.

Description of roll sharpening lathes in steel mill practice.

20-73. Band Sawing, Filing, and Polishing. J. H. Bird. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 225-232.

Combination sawing, filing and polishing band machines are discussed and the developments leading up to the present high efficiency. Also deals with the training of operators, and refers to experimental work in progress in the U. S.

20-74. Zinc-Alloy Cast Jaws Facilitate Machining Operations. *Machinery (London)*, v. 64, Jan. 20, '44, pp. 73-74.

Production of jaws from a commercial type of fusible alloy led to casting the jaws from a zinc-base alloy (Kirksite A) because of the need for a harder and more durable material.

20-75. Grinding of Tools. Kark Lüdtke. *Engineers' Digest*, v. 1, Feb. '44, pp. 177-179.

Grinding punches to required shape immediately after machining and hardening. Working allowance from 0.3 to 0.4 mm given. Profile grinding wheels, copy-grinding and use of templates.

20-76. Practical Ideas from Practical Men. *American Machinist*, v. 88, March 2, '44, pp. 99-104.

Handwheel spokes burred on the drill press. Expanding arbor cuts lathe set-up time. Grease gun adapted for oiling lathe centers. Gage sets flame cutting torches quickly. Thumb jack supports long work for milling. Spotfacing tool reaches offset holes. Angle gages check accuracy of pipe bends. Washer prevents collets from collecting chips. Adaptors for riveter eliminate hand work. Limit gage has wide range of settings.

20-77. A Machine Tool Builder Makes Naval Diesel Engine Cases. George L. Kluter. *Iron Age*, v. 153, March 2, '44, pp. 40-45.

Faced with a rapid decline in turret lathe business, Warner & Swasey Co., Cleveland, took a contract for machining destroyer and submarine type diesel engine cases and developed some unique ideas in setup and tooling.

20-78. How to Obtain Longer Tool Life. E. T. Larson. *Steel*, v. 114, March 6, '44, pp. 136, 168, 170.

Methods of Norton Co. in reclaiming milling cutters, end mills, counterbores and drills.

20-79. New Technique in Milling. Orlan W. Boston. *Metal Progress*, v. 45, March '44, pp. 481-483.

Machining and ruting of aluminum aircraft parts have been done at such extraordinary speed that the whole problem of tools and machinery for cutting metals—especially steel—is again under scrutiny.

20-80. Machining Coarse-Grained Zinc. Gerald Edmunds. *Metal Progress*, v. 45, March '44, p. 509.

How to avoid cleavage fractures when coarse-grained zinc is machined.

20-81. Thread Milling. *Automobile Engineer*, v. 34, Feb. '44, pp. 79-81.

Developments in special-purpose machines.

20-82. Cemented Carbides. M. Littmann. *Automobile Engineer*, v. 34, Feb. '44, pp. 59-62.

Recent German practice in the application of several grades of cemented carbides to various tools.

20-83. Stellite Faced Valve Machined with Carbides. *Iron Age*, v. 153, March 9, '44, p. 60.

Machining of Stellite and steel simultaneously with the same cutting tools on a mass production basis by Thompson Aircraft Products Co., Euclid, Ohio.

20-84. Milling Steel with Carbide Tipped Cutters. Fred W. Lucht. *Iron Age*, v. 153, March 16, '44, pp. 56-63.

Compares fly milling with the action of a single point tool taking an interrupted facing cut in a lathe and shows why negative axial rake angles are desirable for maximum cutter life. Exhaustive analysis of all the cutter angles.

20-85. End Milling Gets the "Speed-up." Guy Hubbard. *Steel*, v. 114, March 13, '44, pp. 100, 102.

Air turbines and high-frequency electric motors, already well entrenched in woodworking field, are crashing gates of machine tool industry.

20-86. Cemented-Carbide-Tipped Milling Cutters. Fred W. Lucht. *Mechanical Engineering*, v. 66, March '44, pp. 192-198.

Design considerations in applying cemented carbides, multitooth cutters, design of cutter body, fly cutting, rigidity in milling, operating precautions.

20-87. Chip Control with Sintered-Carbide-Tipped Tools. Malcolm F. Judkins. *Mechanical Engineering*, v. 66, March '44, pp. 201-202.

Factors in chip formation, methods of controlling chips, ground-in-chip groove, procedure for grinding grooves.

20-88. Selection and Application of Milling Cutters. *American Machinist*, v. 88, March 16, '44, pp. 113-124.

Hand of rotation; selection of milling cutters; profile-type milling cutters; shaped profile cutter; formed milling cutters; inserted tooth milling cutters; proper application of milling cutters; care of milling cutters; sharpening practices are important.

Grossmann's Detroit Lecture Counterbalances Bad Weather

Reported by W. G. Patton
Climax Molybdenum Co.

Detroit Chapter—It wasn't foreseen that just about the worst spell of weather the city has seen this year would arrive at the same time National President Marc A. Grossmann and National Secretary W. H. Eisenman made their annual pilgrimage to Detroit. However, the rewards to those who risked life and limb to get to the Rackham Building on Feb. 14 to hear Dr. Grossmann's lecture easily offset the small inconvenience of battling the elements.

Dr. Grossmann's lecture, "The Effects of Alloying Elements in Steel", has been reported previously in THE REVIEW, but one member's reaction to it seems worth repeating. "Dr. Grossmann," he said, "has a rather remarkable talent. He is a 'Professor' who never gets ahead of the class. Every step in his lectures is carefully developed and clear to his entire listening audience. Furthermore, his lecture is probably the only one on alloying elements given in Detroit in the past five years that was not saturated with S-curves."

Bill Eisenman was in his usual good form, combining the latest news on the farm, Washington and Hollywood with a pleasing and effective picture of the state of A.S.M.

Advantages of Carboloy Are Higher Cutting Speed, Finer Finish, Long Life

Reported by C. M. Hovey
Superintendent, Testing Laboratory
University of Manitoba

Manitoba Chapter—"Cemented Carbides" formed the subject of the regular monthly meeting on Feb. 10, addressed by J. A. Rogers, a representative of the Canadian General Electric Co.

Mr. Rogers traced the history of Carboloy and similar cemented carbides sold under various other trade names, and indicated its great economic value to industry because of increased cutting speeds, finer finishes, and longer life compared with ordinary tool steels. At the conclusion of his address the speaker showed a film illustrating the applications of Carboloy and indicating the special precautions to be observed when using Carboloy cutting tools. A very interesting discussion followed and Mr. Rogers was accorded a hearty vote of thanks.

The meeting was brought to a close with a film entitled "Wire," shown through the courtesy of the Bethlehem Steel Corp.

S. L. Hoyt to Give Golden Gate Lecture Series

Golden Gate Chapter has selected Samuel L. Hoyt, technical advisor, Battelle Memorial Institute, Columbus, Ohio, to deliver its 1944 educational lectures. "Properties Selection, and Specification of Alloys" is the subject of the course, which will be presented at the University of California, Berkeley, on April 19, 20, 21, 24 and 25.

Metal Literature Review

20, MACHINING

(*Continued from page 10*)

20-89. Practical Ideas. *American Machinist*, v. 88, March 16, '44, pp. 107-112.

Hand tool controls dimensions on forgings. Ring prevents toolholder from spreading. Templet locates airplane camera window accurately. Indicator location changed on grinder. Combined push-pull adjustment screw. Tubing drill jig has quick-loading features. Lock added to cable connectors. Slotting cuters ground to form cut-off tools. Cement reclaims damaged masonite form blocks. Indicator measures diameter of small holes. Sheet-metal gage checks size of bored holes. Adjustable tool spotfaces curved deck plates.

20-90. Combined Shop Ideas Improve Tooling Set-Up. A. Ainsworth. *American Machinist*, v. 88, March 16, '44, pp. 102-104.

Teamwork among set-up men, shop supervisors and tooling engineers results in cheaper and more effective layout for producing fuze bodies on automatic lathes.

20-91. Tooling the Automatic Screw Machine, IX. Noel Brindle. *Modern Machine Shop*, v. 16, March '44, pp. 162-164, 170, 172, 174, 176, 178, 180, 182, 184.

Methods of eliminating the burr raised by cutting-off. Design of recessing tools.

20-92. For Versatility—the Drill Press. John E. Hyler. *Modern Machine Shop*, v. 16, March '44, pp. 206-208, 210, 212, 214, 216, 218, 220, 222, 224, 226.

Drill press adapted to perform a wide variety of operations other than that for which it was intended.

20-93. Clipping and Broaching Operations on Die Castings. B. D. S. *Machinery* (London), v. 64, Jan. 27, '44, pp. 106-108.

Construction and operation of clipping dies for removal of flash or fin of metal at the parting line.

20-94. Method of Grinding Crankshafts on Centreless Grinders. E. E. Fluskey. *Machinery* (London), v. 64, Jan. 27, '44, pp. 97-98.

Method of grinding single-throw crankshafts on a standard centreless grinder. It is also possible to grind double-throw crankshafts, also components where there are two different diameters which are to be concentric, thus eliminating the necessity of dressing steps in expensive grinding wheels to conform to the diameters required.

20-95. Practical Application of Quality Control. W. A. Bennett and J. W. Rodgers. *Machinery* (London), v. 63, Dec. 30, '43, pp. 737-740.

Ten per cent saving in production costs are being effected by dimensional quality control in a factory making small metal components to close tolerances on single- and multi-spindle automatics. Machine efficiency has increased 14% and 70% inspection labor hours have been saved.

20-96. Modern Machine Tool Production. T. P. N. Burness. *Machinery* (London), v. 64, Jan. 27, '44, pp. 101-102.

Standardization practice for the machine tool builder. Drawing office, records department, inspection department, metallurgical department, repetition basis in machine-tool production, machine moulding, operatives.

20-97. How to Get the Most Out of Carbide Tools. *Machinery* (London), v. 63, Dec. 30, '43, p. 735.

Examples of carbide tools in armament work; results obtained by hyper-milling.

20-98. Hydraulic Machine Speeds Back-Spotfacing of Cylinder Barrel Bolt Holes. *Product Engineering*, v. 15, March '44, pp. 154-156.

Back-spotfacing operations on cylinder barrel flanges have been eliminated through the development of a multiple-spindle hydraulic machine which spotfaces 20 bolt holes in one set-up. Production rate is 26 or more cylinder barrels per hour. Designed and manufactured by Snyder Tool & Engineering Co.

20-99. Screw Machine Progress. L. D. Spence. *Tool Engineer*, v. 13, March '44, pp. 87-90.

Varied arrangements of spindle speeds and increased r.p.m. have met machining requirements of modern materials. Supplementary advantages are accessories and improved attachments which reduce idle time. Automatic screw machine advancement is traced through developments of the Brown & Sharpe Co.

20-100. Tooling to Machine Heavy Castings. Jerome Wilford. *Tool Engineer*, v. 13, March '44, pp. 67-70.

Design and construction of a 32-ft. vertical honing machine and the use of cast boring bars, are typical Cooper-Bessemer tooling developments, applied to boost production efficiency.

20-101. Is Magnesium a War Baby? Wallace Scotten. *Tool Engineer*, v. 13, March '44, pp. 99-102, 104.

Less than ¼ the weight of iron, magnesium has a war record of revolutionary functional advantages which promise increased attention from designers. Fabricating problems are outweighed by ease and economy of forming and machining.

20-102. Jig Boring at Full Capacity. Frank O. Hoagland. *Tool Engineer*, v. 13, March '44, pp. 71-75.

What a working drawing should contain, why expansion affects tolerances, how the rotary table is used, and how the jig borer can serve as an inspection tool, are pointers to economical production.

20-103. Negative-Rake Milling a Revolutionary Development in Shop Practice. Charles O. Herb. *Machinery*, v. 50, no. 7, March '44, pp. 138-157.

Production experiences of prominent aircraft companies who have pioneered in the development of the new milling technique that has achieved such startling results.

20-104. Milling Aluminum at Cutting Speeds up to 19,000 Feet a Minute! J. S. Haldeman. *Machinery*, v. 50, no. 7, March '44, pp. 176-182.

Practice in a plant of the Lockheed Aircraft Corp. on milling machines equipped with spindles driven by high-cycle motors.

20-105. Turning With Negative-Rake Lathe Tools. *Machinery*, v. 50, no. 7, March '44, pp. 183-185.

Very heavy cuts can now be taken on alloy steel with carbide tools. Forgings for these gun barrels were made from high nickel-chromium steel.

20-106. Multiple-Tool Steel Turning With Carbide-Tipped Cutters. Ralph Granzow. *Machinery*, v. 50, no. 7, March '44, pp. 187-189.

Information concerning the proper nose radii, rake, and chip-breaker width on tools for turning steel.

(Continued on page 12)

Salt Baths Classified As Neutral, Oxidizing And Reducing Types

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

Ontario Chapter—Various types of salt baths (neutral, oxidizing and reducing), and their application to heat treatment of tool steels and to other phases of metal treatment were discussed on Feb. 4 by Haig Solakian, vice-president, A. F. Holden Co., New Haven, Conn.

Neutral salt baths are made with chlorides, fluorides and silicates in various combinations. No one compound can operate properly over the full range of temperature required in these neutral baths, so two types are employed—a low temperature (1000 to 1650° F.) and a high temperature bath (1750 to 2350° F.). The low temperature bath is used in tempering high speed tools, stress relieving brass, brazing operations, and the normalizing and annealing of steels. The high temperature neutral bath is used primarily in hardening high speed steels.

Tempering, Annealing and Coloring Baths

Oxidizing salt baths are readily divided into three general groups—tempering baths operating at 300 to 1150° F.; annealing baths at 1100 to 1550° F.; and coloring baths at 850 to 1000° F. Nitrates and nitrites are commonly employed in tempering baths and such mixtures should not be heated over 1150° F. or they will attack the pot and tools.

Annealing baths operating at 1100 to 1550° F. are commonly made up of carbonates and chlorides. They are used for annealing silver, gold, and non-ferrous alloys. Coloring baths are used in tempering and coloring springs, and in coloring nuts, bolts and stampings with a black iron oxide film at temperature of 850 to 1000° F. Steel can also be given a blue finish in suitable salt baths.

There are two classifications of reducing baths—low temperature (950 to 1150° F.), and carburizing (1450 to 1750° F.). Reducing baths are primarily sodium and potassium cyanide.

Immersion Heaters Eliminate Oxidation

Pressed or welded steel, alloy steel and ceramic pots are used, depending upon the temperature of the bath and the nature of its constituents. Immersion type heaters that can be used up to 1100° F. eliminate trouble from oxidation of steel pots when they are heated externally. Oil, gas and electric firing are employed. Internal heating can also be done by electrodes.

Dr. Solakian named the most important characteristics of salt baths as follows: They should be thoroughly liquid and reasonably neutral to tools and pots; the salt should wash off the parts readily and not develop sludge; baths should carry electric current to permit the use of electrodes. Operators of salt baths should exercise care with respect to temperatures and timing.

Metal Literature Review

20. MACHING

(*Continued from page* 11)

20-107. Taper Line-Reaming Ship Drive-Shaft Flanges. George D. Bowman. *Machinery*, v. 50, no. 7, March '44, pp. 195-196.
Portable machine tool mounted on a drive-shaft to line-ream tapered holes through flanges of ship line and propeller shafts. Holes reamed within a tolerance of 0.001 in.

20-108. Power Required in Milling With Negative-Rake Cutters. Hans Ernst. *Machinery*, v. 50, no. 7, March '44, pp. 197-199.
Results of investigations conducted by the research laboratory of the Cincinnati Milling Machine Co.

20-109. How to Secure Fine Surfaces by Grinding. H. J. Wills. *Machinery*, v. 50, no. 7, March '44, pp. 211-213.
Fundamentals of lapping.

20-110. The Precision Machining of Magneto Housings. Edward H. Moll. *Die Casting*, v. 2, no. 3, March '44, pp. 20-21.
Precision machining is required on the main housing of the aircraft engine magnetos manufactured by the American Bosch Corp. By providing first rate machine tools and equipping them with excellent jigs and fixtures it is possible to produce completely machined die cast housings held within the narrow dimensional limits specified and to do it with economy on a quantity production basis.

20-111. Precision Contouring Is Done Automatically. Guy Hubbard. *Steel*, v. 114, March 27, '44, pp. 90, 92, 120, 122.
Cycle control through instruments which operated "in reverse." They translated ideal graphs of time and temperature conditions back to the process itself, thus effecting automatic control of the process.

20-112. Recessed Jigs. C. W. Hinman. *Tool & Die Journal*, v. 9, March '44, pp. 98B-98F.
Modern designs for drilling jigs and tapping fixtures.

20-113. Apprentice Training. E. S. Webster. *Army Ordnance*, v. 26, March-April '44, pp. 299-302.
Watervliet Arsenal's program for developing skilled machinists.

20-114. Operations on 90-mm. Anti-Aircraft Gun Mountings. *Machinery* (London), v. 64, Feb. 24, '44, pp. 205-209.
Component parts are welded and machined in special fixtures that ensure complete interchangeability in the ship and in the field.

20-115. Turning and Other Operations on Die Castings. B. D. S. *Machinery* (London), v. 64, Feb. 24, '44, pp. 217-219.
Choice of location surfaces, dimensions liable to vary, tooling, spinning operations.

21. CLEANING AND FINISHING

21-28. Shot Blasting. H. H. Clark. *Steel*, v. 114, Feb. 28, '44, pp. 100, 102, 137.
Prolongs life of leaf, torsion and helical springs.

21-29. Protective Coating and Camouflaging. Emerson D. Lapsley. *Automotive and Aviation Industries*, v. 90, March 1, '44, pp. 19, 72-76.
Cleaning and plating operations for protective coatings on fighter plane parts.

21-30. Infra-red Heating. *Aircraft Production*, v. 6, Feb. '44, pp. 101-102.
Application to the drying of large aircraft assemblies.

21-31. Surface Finish. W. E. R. Clay. *Institution of Automobile Engineers Journal*, v. 12, Feb. '44, pp. 9-23.
General remarks on surface finish measurements and analysis. Equipment (photograph of "Talysurf"). Surface standards and standardization. Manufacture of standard test pieces. The effect of surface finish improvement.

21-32. The Nature of Foreign Deposits on Metal Surfaces. P. D. Liddiard. *Metal Finishing*, v. 42, March '44, pp. 145-147, 166-167.
Deposits in the solid liquid and gaseous phases, adsorbed layers, kinetic considerations, diagrammatic representation, removal of solids, liquids, and gases.

21-33. How to Use Trichlorethylene Solvents. Herbert H. Hines. *Iron Age*, v. 153, March 9, '44, pp. 61-64.
Solvent types of cleaning equipment, their use and maintenance. Proper utilization gives superior cleaning at less cost, with dangers inherent in handling this chemical reduced to a minimum.

21-34. Shot Blasting Gears to Improve Fatigue Life. *Iron Age*, v. 153, March 16, '44, p. 63.
Surface peening by means of shot. A cleverly devised fixture which exposes all wear portions of the gear teeth to direct and right-angled blast in a closed chamber.

21-35. Gas Pickling and Coating of Cold-Rolled Strip. R. F. Renkin. *Steel*, v. 114, March 27, '44, pp. 102-104.
Pickling steel strip of rimming quality or wire in a mixture of neutral flue gas and hydrogen chloride gas leaves the surface free from blisters and improves adherence of coating.

21-36. Submerged Heating Speeds Pickling. Thomas E. Lloyd. *Iron Age*, v. 153, March 23, '44, pp. 57-60.
The use of submerged combustion burners for heating pickling tanks has resulted in savings of time, acid and equipment, as well as better working conditions in steel mill pickling departments, according to a survey of users of this equipment.

21-37. Industrial Dryers and Drying Systems; II. A. W. Ferre. *Industrial Heating*, v. 11, March '44, pp. 428, 430, 433.
The fundamentals of drying by evaporation at atmospheric pressure. The principles involved, and descriptions of typical dryer installations.

21-38. Aluminum Cleaning Methods. Arthur S. Kohler. *Welding Engineer*, v. 29, March '44, pp. 46-48.
The spur of wartime necessity has developed effective new techniques for speeding aluminum spot welding. Of these, improved chemical cleaning techniques have probably contributed as much as anything else to reduce the frequency of spot welding engineers' headaches.

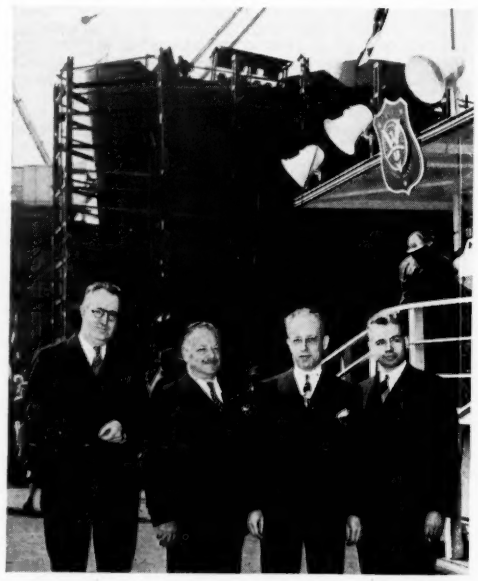
21-39. Electrolytic Polishing of Metals. S. Wernick *Canadian Metals and Metallurgical Industries*, v. 7, March '44, pp. 29-32, 37.
Industrial application to stainless steel, nickel and aluminum.

Visit to Swan Island On Officers' Itinerary

Harry J. Kaiser's Swan Island Shipyard at Portland was a point of interest viewed by National President M. A. Grossmann and National Secretary W. H. Eisenman, when they visited Portland to speak before the Oregon Chapter. After a tour through the busy shipyard, they witnessed the launching of the 59th of the 16,800-ton tankers, the largest merchant ships being built on the Pacific Coast.

In the true Kaiser spirit, the yard was erected and began producing ships in an "impossible" period of time. On March 16, 1942, the ground-breaking ceremony was held at Swan Island, formerly Portland's Municipal Airport. Construction of the first ship was started June 1; it was launched on Oct. 24. A true appreciation of the magnitude of the job done by the Kaiser organization can only be gained by seeing the many large industrial buildings, the eight ways on which the ships are constructed, and the many huge whirly cranes which lift large prefabricated sections of the ships and set them accurately in place.

The tankers built at Swan Island are 523 ft. long with a beam of 68 ft. and, at launching, weigh approximately 4900 tons dead weight.



G. E. Healy, Portland Gas & Coke Co. (Extreme Left) and N. L. Peck, Pacific Metal Co. (Extreme Right), Both Past Chairmen of the Oregon Chapter A.S.M., Accompanied National Secretary Eisenman and National President Grossmann on a Tour of Kaiser's Swan Island Shipyard During Their Recent Visit in Portland.

Dixon Ably Presents Forging Talk By Candlelight; Many Questions Asked

Reported by G. W. Whitney
Metallurgist, Emsco Derrick & Equipment Co.

Los Angeles Chapter—E. O. Dixon, chief metallurgical and mechanical engineer of the Ladish Drop Forge Co., Cudahy, Wis., spoke on "Better Metal Quality Through Forging" at the meeting on Feb. 24. Mr. Dixon covered the various phases of forging and pointed out the factors which affect metal quality. The relation of physical properties to amount and methods of working to shape was shown.

In order to prove the speaker's ability to present his subject, the Los Angeles Utilities conspired to eliminate the electrical service during the talk. The speaker rose to the occasion and proceeded by candlelight minus any assistance from charts and diagrams. His able presentation of the subject produced many questions from the floor covering all phases from inspection to heating methods and cooling rates.

Hartford Chapter Members Instruct New Trade School Course

The Hartford State Trade School announces that it has established a new heat treating and metallurgical department which opened March 15. An evening course has been established to teach the practical aspects of cyaniding, pack carburizing, gas carburizing, and the hardening and tempering.

W. E. Bancroft, chief metallurgist at the Pratt & Whitney Division of Niles-Bement-Pond Co., and a past chairman of the Hartford Chapter A.S.M., and John Swift, chief metallurgist at the Billings & Spencer Co., present secretary-treasurer of the Hartford Chapter, both of whom have an enviable reputation in the metallurgical field, will act as instructors.

Metal Literature Review

22. WELDING, BRAZING AND FLAME CUTTING

22-107. Storage Battery Welding System. *Steel*, v. 114, Feb. 28, '44, pp. 104, 106.
New batteries and new carbon pile "interruptor."

22-108. Welded and Riveted Joints Compared. J. Dearden. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 207-210, 232.
The resistance of welded and of riveted joints to static and dynamic loading is compared with that of the parent plate as rolled. Reasons for the growing confidence in welded joints discussed and the limitations to the reinforcement of riveted joints by welding indicated.

22-109. Light-Alloy Spot-Welding Machine. *Engineering*, v. 157, Jan. 21, '44, pp. 47.
Description and illustrations of the high-capacity light-alloy spot-welding machine developed by Messrs. Philips Industrial (Philips Lamps, Limited).

22-110. Tips Added to Coated Electrodes Reduce Welding Costs. *American Machinist*, v. 88, March 2, '44, p. 87.
Savings in production costs on welding jobs can be made by using fully coated rods butt welded to short lengths of plain mild steel rods, thus enabling the welder to use all of the coated rod.

22-111. 1943 Electric Arc Welding Developments. R. F. Wyer. *Modern Industrial Press*, v. 6, Feb. '44, pp. 13, 48.
Arc welding of magnesium in repair of castings; gas-shielded arc welding of wrought magnesium alloys; Changes in a.c. arc welding field with introduction of E-6011 electrodes. Use of outdoor type welders.

22-112. Engineering Control Is the Key to Lower Welding Costs. W. J. Conley. *Modern Industrial Press*, v. 6, Feb. '44, p. 34.
Production, methods and time study departments effect real savings by use of proper jigs and fixtures.

22-113. Resistance Welding. *Aircraft Production*, v. 6, Feb. '44, p. 98.
A Philips development for heavy-gage light alloy work.

22-114. The Weibel Electric Welding Process. *Aircraft Production*, v. 6, Feb. '44, pp. 93-95.
German information regarding its application for aircraft construction.

22-115. Metallic Arc Welding Electrodes. Harold Lawrence. *Steel*, v. 114, March 6, '44, pp. 116-119.
Various codes and identifications for welding electrodes designed to provide practical information for operators of welding equipment; suggests standardization of testing methods and cites need for simplification.

22-116. Arc Welding Technique for Stainless Steel. Charles Pettit. *Aero Digest*, v. 44, Feb. 15, '44, p. 102.
Making welds, electrode consumption.

22-117. Arcweld Ventilated Housings for Outdoor Motors. R. W. Gladson. *Industry & Power*, v. 46, March, '44, pp. 63-64, 138.
Design and fabrication of weatherproof fan-ventilated housings solve the problem of protecting 75-hp. motors of exposed pumping units. Cost is much lower than expense of constructing a building.

22-118. The Application, Use and Control of Silver Solder Fluxes. H. L. Anthony. *Steel*, v. 114, March 13, '44, pp. 94-96, 134, 136.
Types of fluxes: compositions of solid, paste and saturated solution fluxes; chemical composition of volatile fluxes; cleaning prior to fluxing and brazing; pH of applied fluxes; equilibrium at interface; removal of fluoride fluxes after brazing.

22-119. Metallic Arc Welding Electrodes. Harold Lawrence. *Steel*, v. 114, March 13, '44, pp. 98, 138-142.
Various classes of electrodes and their characteristics. Possibility of getting maximum value from arc welding comes only with a thorough knowledge of the characteristics of each type of rod. Class E 6010 rods discussed.

22-120. Brazing. *Steel*, v. 114, March 13, '44, p. 114.
Shows its versatility in volume production of many types of joints.

22-121. Welding Refinements Simplify Sheet-Metal Fabrication. *Product Engineering*, v. 15, March '44, pp. 166-169.
Electronic control of current in arc and resistance welding boosts the fabrication of light-gage sheet metal parts. Welding can replace riveting for this type of fabrication. Typical examples suggest welded stampings for simplified design.

22-122. Resistance Welding. Kenneth Rose. *Metals & Alloys*, v. 19, Feb. '44, pp. 357-363.
Welding carbon steel, stainless steel, aluminum, magnesium, copper and their alloys. Operating variables.

22-123. Welding Speeds Forged Bogie Arm Production. *Industry and Welding*, v. 17, no. 3, March '44, pp. 33-40.
The removal of flash, after completing production jobs of this kind, is an important factor, both from the cost and materials-flow standpoints. Here's how International Harvester Co. does it.

22-124. Control of Surge for Large Resistance Welding Users. G. L. Baughman. *Industry and Welding*, v. 17, no. 3, March '44, pp. 50-58.
Staggered operation of welders holds peak power demand to necessary limits without reduction of output.

22-125. Automatic Cutting and Welding of Sprockets. C. B. Dorgan. *Industry and Welding*, v. 17, no. 3, March '44, pp. 68-69.
The control of distortion in welding high carbon to low carbon steel.

22-126. Erection and Welding Sequence as Applied to Welded Steel Hulls. Montgomery Q. Cellers. *Welding Journal*, v. 23, March '44, pp. 205-216.
A study of expansion and contraction of metal in relation to welding; method of controlling residual stresses and fabricating fair structures; flat and vertical keels; bulkheads and deck subassemblies; subassembly of a double bottom or platform, floors and bulkheads; subassembly of bow and stern; erection and welding of the hull of vessels of longitudinal construction; sequence for cargo vessels; the bottom shell; the double botttom; bulkheads, side shell, framing and decks; erection and welding of the superstructure and bilge plates.

22-127. Machine Welded Metal Tubing. G. C. Gridley. *Welding Journal*, v. 23, March '44, pp. 217-224.
Tube mill operations. Materials, welding, finished parts.

Metal Literature Review—*Continued*

22. WELDING

(*Continued from page 12*)

22-128. Resistance Welding of the Future. Malcolm Clark. *Welding Journal*, v. 23, March '44, pp. 224-226.
Developments to include spot welding machines, electrode materials, non-destructive testing, etc.

22-129. The Control of Welding in Shipbuilding. Russell W. Brendle. *Welding Journal*, v. 23, March '44, pp. 227-232.
Necessity for and the operations of a welding control center.

22-130. Field Welding of Steel Penstocks and Tunnel Liners. L. G. Christofferson. *Welding Journal*, v. 23, March '44, pp. 233-237.
Welding problems discussed with reference to two operations, the first of which is the welding of the plates into single or multiple ring sections in an assembly yard adjacent to the erection site, and second of which is the welding together of these sections in their final positions.

22-131. Arcless Current Interruption in Inductive D. C. Circuits. Charles W. Dodge, John S. Stamm and Nelson W. Spencer. *Welding Journal*, v. 23, March '44, pp. 238-243.
Problems involved in interrupting inductive circuits, method of current interruption by means of multiple pole contractors, physical considerations of shunting a condenser across a contactor, circuit equations when using shunt condensers, and description of new high-speed contactor.

22-132. Peening—Its Effect on Relief of Residual Stresses, Distortion and Mechanical Properties of Welds. W. Spraragen and M. A. Cordovi. *Welding Journal*, v. 23, March '44, pp. 121s-143s.
Equipment and technique, effect on relief of stresses, on distortion, on mechanical properties; grain refinement, hardness. 148 ref. Review of the literature to July 1, 1943. Foreign literature to Jan. 1, 1941.

22-133. Two-Tone Welding. J. A. Cunningham. *Welding Engineer*, v. 29, March '44, pp. 33-36.
Use of two-tone process with and without applicator bars speeds welding.

22-134. "Storage Battery" Welding. *Welding Engineer*, v. 29, March '44, p. 45.
D. C. resistance welder using storage batteries as a source of welding current.

22-135. Prefabricated Ship Piping. Ivan Chapman. *Welding Engineer*, v. 29, March '44, pp. 50, 52.
Installation of the 32,000 ft. of piping a Liberty Ship needs is a task requiring welding under confined conditions and fitting in almost inaccessible places. The job can be greatly simplified, however, by doing much of the fitting for final assembly outside the ship hold.

22-136. Storage Resistance Welder Developed. *Iron Age*, v. 153, March 23, '44, p. 61.
Practical D. C. resistance welder using storage batteries as a source of welding current.

22-137. Metallic Arc Welding Electrodes. Harold Lawrence. *Steel*, v. 114, March 20, '44, pp. 98, 101, 134, 137.
Discussion of class E6011 electrodes. More slagless gas, standardize on E6011, air-conditioned storage ideal.

22-138. Metallic Arc Welding Electrodes. Harold Lawrence. *Steel*, v. 114, March 27, '44, pp. 98, 100, 136-137.
Characteristics and most important applications.

22-139. Tests Prove Advantages of Flame Soldering Cable Joints. R. C. Fitzgerald. *Electric Light and Power*, v. 22, no. 3, March '44, pp. 70-72.
Saves solder and does not require high degree of skill. Microscopic examinations aid studies. Successful technique is explained.

22-140. Capacitors Aid Resistance Welders. J. E. Ponkow and N. A. Smith. *Westinghouse Engineer*, v. 4, March '44, pp. 34-38.
Users of resistance welders can almost double the capacity and current consumption of their machines, not by adding transformers or increasing the power demand, but through the addition of series capacitors.

23. INDUSTRIAL USES AND APPLICATIONS

23-58. NE Steels in the Manufacture of Machine Tool Parts. George Bissett. *Steel*, v. 114, Feb. 28, '44, pp. 92-93, 128.
Advantages and processing ideas.

23-59. Light Alloy Pistons From German Aircraft. C. Wilson. *Metal Treatment*, v. 10, Winter, '43-'44, pp. 255-261.
Summary of various investigations on some light alloy pistons from German aircraft carried out in research laboratories in this country.

23-60. Cartridge Case Steel. R. E. L. Stanford. *Iron & Steel Engineer*, v. 21, Feb. '44, pp. 31-37, 41.
Steel cartridge cases came as a result of a brass shortage. Because the steel cases are not as desirable nor as easily made, and because of marked improvement in the brass situation, the production of steel cases has been called off.

23-61. New Tools from Scrap High Speed Steel. U. F. T. Norris. *Engineers' Digest*, v. 1, Feb. '44, pp. 149-150.
Description of the re-fabrication of straightforward turning tools.

23-62. Light Alloys in Ship Construction. *Engineering*, v. 157, Jan. 21, '44, pp. 52.
History and developments of using light alloys in ship construction.

23-63. Development of Super-Tension Cables in Great Britain. F. W. Main. *Engineers' Digest*, v. 1, Feb. '44, pp. 158-160.
Details and design of manufacturing super-tension cables.

23-64. Piston Rings of Bronze. Tracy C. Jarrett. *Metals and Alloys*, v. 19, Feb. '44, pp. 351-356.
Melting bronze in high-frequency induction furnaces. Control, analysis, microstructure and uses.

23-65. The Effect of White-Metalling Crankshaft Journals. Tom Brown. *Institution of Automobile Engineers Journal*, v. 12, Feb. '44, pp. 24-26.
Preparation, testing and examination.

23-66. Design and Installation of Pulleys and Pulley Brackets. Hal. R. Linderfelt. *Aero Digest*, v. 44, Feb. 15, '44, pp. 82-86, 218.
Close alignment vital, alignable bracket, eccentric loads possible, strength and fatigue tests.

23-67. The Hercules Crankshaft. J. A. Oates. *Aircraft Production*, v. 6, Feb. '44, pp. 59-66.
Design features: Machining and assembly operations at a shadow factory.

23-68. Steel-Tube Airscrew Blades. *Aircraft Production*, v. 6, Feb. '44, pp. 71-75.
Production technique of the American Propeller Corp.

23-69. A Comparison of Some Properties of Beams in Magnesium and Aluminum Alloys. *Metallurgia*, v. 29, Jan. '44, pp. 135-137.
Some properties of uniform stable cantilever beams in the form of round or square bar angle or T section, channel, I section or tube in Mg and Al alloys are compared theoretically and in a preliminary way, and the results are presented in graphical form for quick reference.

23-70. Aluminum in Military Science. *Light Metals*, v. 7, Feb. '44, pp. 65-71.
Applications of light and ultra-light alloys in spheres specific to military practice and technique. Chemical reactivity, low specific weight and certain promising projectile-resisting qualities of light alloys are among the aspects reviewed.

23-71. Light Metals and the Art of Music. *Light Metals*, v. 7, Feb. '44, pp. 95-100.
The physical and acoustic properties of Al alloys (and of certain Mg base alloys) have been put to practical use in the development of a variety of musical instruments, ranging from pianos to bells.

23-72. Railroad Materials After the War. C. B. Bryant. *Railway Age*, v. 116, March 4, '44, pp. 461-463.
Products now in use will be improved. Wartime developments will offer new materials and products. All departments are affected.

23-73. The Hawker Typhoon Single-Seater Fighter and Its Napier-Sabre Engine. *Metallurgia*, v. 29, Jan. '44, pp. 119-120.
Sabre engines are being produced in increasing numbers for mounting in one of the latest fighter planes, the Typhoon.

22-74. Interchangeability Aids Production and Salvage of Lancaster Bombers. *American Machinist*, v. 88, March 2, '44, pp. 105-120.
Lancaster four-motor bomber produced to interchangeability standards established by the British Ministry of Aircraft Production. More than 100 subassemblies produced in Canada are fully interchangeable with similar components produced elsewhere in the Empire. This feature, a definite policy of M.A.P. keeps fighting formations at maximum effectiveness through rapid repair of damaged planes.

23-75. Barb Wire Collection. Jewell Ross Davis. *Wire & Wire Products*, v. 19, March '44, pp. 178, 190-191.
Development of barb wire to the important place it occupies in our economy in peace and war.

23-76. Castings and Forgings Replace Aircraft Weldments. *Iron Age*, v. 153, March 9, '44, pp. 52-53.
Comparison of cast aluminum and welded steel assemblies.

23-77. Fabricating Transformer Tanks. H. W. Allison. *Steel*, v. 114, March 13, '44, pp. 92-93.
Tanks are made from low-carbon steel plate to provide good welding quality. Plate must possess a high degree of flatness, be free from laminations and porosity to prevent leakage of the transformer oil, and withstand bending without fracture. Technique used.

23-78. The Building of Gliders. Howard Campbell. *Modern Machine Shop*, v. 16, March, '44, pp. 124-130, 132.
Tools and methods employed by the Gibson Refrigerator Company, Greenville, Michigan, in the building of motorless planes.

23-79. Piston Crown Temperatures in Compression-Ignition Engine with "Comet" Head. W. L. Bride. *Institution of Mechanical Engineers*, v. 150, Feb. '44, pp. 134-139.
Tests on a high-speed compression-ignition engine of 120-mm. bore fitted with a Ricardo "Comet" head in which the piston was "Y" alloy. Temperatures were measured by thermocouples in the crown, the connections to the temperature-measuring apparatus being intermittent, and made only when the piston approached bottom dead center. 8 ref.

23-80. Mass Production of High Explosive Shells. *Machinery* (London), v. 63, Dec. 30, '43, pp. 729-734.
Methods developed by Willys-Overland in the production of 155-mm. shells adopted as standard practice in the U. S. A. Checking concentricity, machining.

23-81. The Manufacture of the Sten Gun. *Machinery* (London), v. 64, Jan. 27, '44, pp. 85-89.
Methods employed in the production of the body case.

23-82. The Manufacture of the Sten Gun. *Machinery* (London), v. 64, Feb. 3, '44, pp. 113-117.
Press-tool methods in the production of the body case.

23-83. The Production of the Magazine for the Sten Gun. *Machinery* (London), v. 64, Feb. 10, '44, pp. 141-146.
Large outputs from the efforts of small firms.

23-84. New Method of Setting Shaped Diamond Tools. P. G. *Machinery* (London), v. 64, Feb. 3, '44, p. 124.
Procedure given for new, practical and economical method in setting diamonds.

23-85. New Model German and Japanese Planes Show Progress in Design Detail. *Product Engineering*, v. 15, March '44, pp. 145-150.
Summary of trends in the engineering of enemy aircraft, as exemplified by new models of the Jap "Hamp," the German Focke-Wulf 190 and the Junkers 88. Current practice and developments in engines, controls and materials are emphasized.

23-86. Universal Control Shafts and Their Development. *Product Engineering*, v. 15, March '44, pp. 194-196.
Use and limitations of universal shafts for remote control through rotating shafts.

23-87. Floating Reamers. *Automobile Engineer*, v. 34, Feb. '44, pp. 69-70.
Two diametrically opposed floating blades and micrometer adjustment, have been incorporated in earlier reamers.

23-88. Coupling the Army's Portable Pipeline. Gordon H. Robertson. *Products Finishing*, v. 8, March '44, pp. 30-34.
The Army's "front-line" portable pipe-line which is used in the field.

(Continued on page 15)

Floradora Girls Entertain At "Quench and Draw" Party

Reported by L. Geerts
Republic Steel Corp.

Boston Chapter—The fourth mid-winter "Quench & Draw Party" on Feb. 18 ended a long two-year drought for chapter members and guests. Abandoning the dignified pursuits of learning, the group decked themselves in "Gay Ninety" costumes for an evening of relaxation in moderation. The quenching was supervised by String Downing in the role of a Max Sennett cop and excellent results were the rule after cooling from critical temperatures.

The evening's entertainment featured Boston Chapter amateurs as Floradora "girls." They presented a strange new routine in an unrehearsed dance number, suitably dressed in large hats, brassieres, and pocketbooks. Following, the Barber Shoppe Quintette strained old song numbers in harmony. Talented professional entertainers further contributed to an enjoyable evening of fun and good fellowship.

Congratulations are due Paul Ffield, chairman of the Entertainment Committee, for the success of a fine party.

Grossmann Speaks at Montreal Meeting

Reported by J. Royer
Engineer, Welding & Supplies Co.

Montreal Chapter—One of the outstanding meetings of the year took place on March 6, when Marcus A. Grossmann, national president of the A.S.M., presented a technical paper entitled "Hardenability of Steel, and the Effect of Alloying Elements."

The meeting opened with the presentation of a film produced by the United States Steel Corp. entitled "To Each Other." This picture depicts the growth and improvement in the company's many plants throughout the United States since the beginning of the war.

Cleveland Executive Committee Member Dies, Was Wellman Engineer

WALTER CORNELL SUTTON, chief engineer of the S. K. Wellman Co., Cleveland, died Friday morning, March 10, following an illness of a few months.

Mr. Sutton was a graduate in mechanical engineering from Rensselaer Polytechnic Institute in 1921, where he continued for one year as an instructor in engineering subjects. For four years he was assistant superintendent for the Strathmore Paper Co., at Woronoco, Mass., and came to Cleveland in 1927 as chief engineer for the Lindsay Wire Weaving Co. In June, 1942, he became associated with the S. K. Wellman Co.

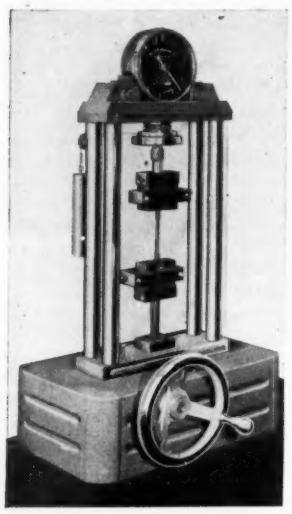
He was very active in the A.S.M. and was a member of the Executive and the Finance Committees of the Cleveland Chapter. He was a member of the Executive Committee of the Cleveland Section, American Society of Mechanical Engineers, and was past president and trustee of the Cleveland Engineering Society.

NEW PRODUCTS IN REVIEW

PORTABLE TENSILE TESTER

W. C. Dillon & Co., Inc.,
5410 W. Harrison, Chicago 44, Ill.

The fore-runner of this new portable tensile tester is serving today in so many war material tests that it is believed the improvements and refinements of this new design will prove interesting.



For the majority of tensile, compression, transverse or shearing tests it will obtain the required control data more simply and economically than the average tester of comparable capacity, it is said. Brazed joints, spot welds, standard rounds or flats, and a host of other subjects may be rapidly analyzed for relative strength.

Although it starts at 0-250 lb. and has seven intermediate and interchangeable indicators up to 0-10,000 lb., it is light in weight (132 lb.) and only 35 in. tall. Its new holder design, for standard V-wedge serrated grips, aids in permitting such a small simply operated tester to handle such loads, and these grips permit especially rapid specimen insertions and removal, by sliding outer holder supports.

Mention R148 When Writing or Using Reader Service

RUST PREVENTIVE

E. F. Houghton & Co.,
240 W. Somerset St., Philadelphia, Pa.

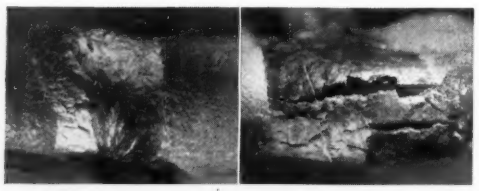
A combined rust preventive, cleaner and fingerprint neutralizer is announced by this company for use in internal plant protection of steel parts between processing or machining operations. This product—Cosmoline No. 805—is intended not to remove rust, but to neutralize the causes of corrosion, particularly acid perspiration from workers handling the parts. It is also effective in protection against corrosion caused by a chemical atmosphere, fumes, or high humidity. This product is a fluid which conforms to requirements of Ordnance Technical Manual TM 38-305. It will meet and exceed 24-hr. salt spray and 100-hr. humidity tests.

Mention R149 When Writing or Using Reader Service

SOLAR FLUX

Solar Aircraft Co., Dept. SF-33, San Diego 12, Calif.

Solar Flux No. 16GH has been developed specifically for the specialized welding of stainless steel and other high alloy chromium-bearing metals. In addition to its higher melting point, this flux has improved adhesive quality desirable for application to the underside and edges of metal. It prevents burning (oxidation); also helps prevent cracking and checking even when weld is subjected to 180° root bend test. Absolutely no carbon pickup results from the flux itself. It can also be used to promote metal flow when applied to stainless steel and other high chromium welding rod. It protects rod from oxidation. Below at left is butt-welding with Solar Flux—at right, with another flux.



There are no fumes from Solar welding flux, and to facilitate efficient shop procedure and speed mass production, it may be applied to metal days before the actual welding operation. It can be used with most welding processes including oxy-acetylene, atomic hydrogen arc, metallic arc and heliarc. A trial sample will be sent to any plant engaged in war production.

Mention R150 When Writing or Using Reader Service

METAL PLATING

Electro Plastic Processes,
2035 W. Charleston St., Chicago 54, Ill.

The new process of metal plating on plastics, glass, etc., developed by Precision Paper Tube Co., has been taken over by this company. Stronger unity of bond between metal and plastic is said to be obtained by the new process. It withstands impact, vibration, and extreme temperatures without peeling or blistering.

Mention R151 When Writing or Using Reader Service

RUST PREVENTION

Oakite Products, Inc.,
26H Thames St., New York 6, N. Y.

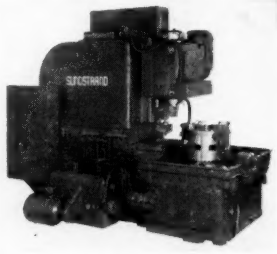
Developed to meet critical production demands for preventing rust on steel and for securing improved adhesion of such organic finishes as paint, lacquer, etc., an acid-type two-function detergent, heretofore restricted to war plants, has now been released for use in all metal working plants by this company. Known as Oakite Compound No. 86, this new development is reported to remove light spinning compounds, drawing lubricants, machining oils, finger marks and shop dirt from steel parts.

Mention R152 When Writing or Using Reader Service

FORM MILLING PROPELLER BARRELS

Sundstrand Machine Tool Co., Rockford, Ill.

This special milling machine has been designed to form mill the radii and angle on the inside of propeller barrels. The part is of tough steel and requires a heavy cut on practically the entire inside edge and bottom. An angular milling cutter with a radius on the bottom, using high speed steel blades, is mounted directly to the spindle which is driven by a 10-h.p. motor. Drive to the spindle is through v-belts with pick-off gears provided to furnish spindle speed changes in a ratio of 30 to 1.

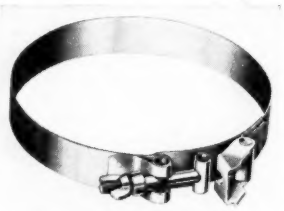


The column is of heavy ribbed construction and, in addition to carrying the vertical way surface for vertical travel of the spindle head, it can be fed and traversed to and from the workpiece. The workpiece itself is held in a special fixture mounted on a 22-in. diameter rotary table. Rigid table permits heavy milling cuts. This table construction is one of three important features of this newly designed machine. Another is the automatic cycle which provides three independent motions, cross feed to the column, vertical feed to the head and rotary feed to the table, all timed and interlocked with the starting and stopping of the spindle and coolant flow. Similar machines can be provided for profile milling

Mention R153 When Writing or Using Reader Service

QUICK-COUPLER CLAMP

Marman Products, Inc.,
940 W. Redondo Blvd., Inglewood, Calif.



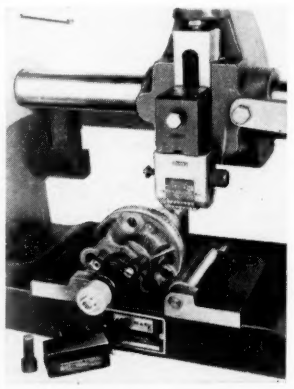
"Quick - Coupler," the name given this new type clamp, combines a snap-on latch with the full adjustment of a standard clamp, all in one unit. This design permits the instantaneous removal of the clamp or its quick installation. It is ideally suited for handling removal equipment such as oxygen containers, fire extinguishers, duct sections, etc.

Mention R154 When Writing or Using Reader Service

NUMBERING CURVED SURFACES

The Acromark Co., 355 Morrell St., Elizabeth 4, N. J.

Numbering of curved surfaces can now be accomplished in the Acromark machine. The combining of standard fixtures in a regular No. 9A machine enabled a large manufacturer of aircraft equipment to speed up the marking production of these parts without increasing personnel. By installing a set of standard non-adjustable cradle rolls and a socket-type mandrel fixture to support and locate the part in the proper marking position, the marking of this peculiarly shaped unit was accomplished as the last operation after the unit was completely assembled and inspected. When a numbering machine with a sight index control was placed in the marking head of this machine and adjusted to the proper marking depth, a part was easily marked at every forward and one at every return stroke of the machine. Changing of characters is quickly accomplished by turning the knob at the right of the numbering head and twirling the wheels to desired irregular or consecutive numbers.



Mention R155 When Writing or Using Reader Service

MOBILE INSPECTION UNIT

Continental Machines, Inc.,
1301 Washington Ave. S., Minneapolis 4, Minn.

A complete inspection department at the point of work is the achievement of this new DoAll inspection unit. Occupying little more than an area 24x42 in., containing a complete precision inspection department, it can be wheeled right up to the point of work on any job. It is said to contain all the necessary instruments and gages to be found in an inspection department. From light

waves viewed through an optical flat, produced by a monochromatic light as its basic standard of measurement, there is provided a set of DoAll gage blocks, gaging instruments and comparator to interpret this standard of measurement in checking dimensions of parts and tools. The set of 83 precision gage blocks has an accuracy in height, flatness and parallelism which is plus or minus 0.000004 in. A calibration chart lists height, flatness and parallelism of these gage blocks.

The set of 20 different precision measuring instruments includes calipers, trammel points, center points, scribers, base blocks, gage holders of 2, 6, 9, and 12-in. capacities, vernier gage block, master square, sine bar, straight edges, master flat and 12x24-in. precision surface plate.

Mention R156 When Writing or Using Reader Service

"FROSTPOINT" ELECTRODES

Frostrode Products,
19003 John R St., Detroit 3, Mich.

Faced with the necessity of joining together more individual pieces per pound of finished product than any other manufacturer of transportation equipment, the aircraft industry is apparently finding the answer to many of its aluminum spot welding headaches in the new "Frostpoint" type of refrigerated electrode, according to a recent survey.

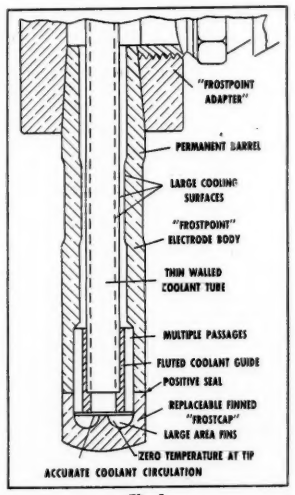


Fig. 1

Improved quality of welds, stepped-up output, and a definite increase in the number of welds obtained between electrode dressings are some of the results reported. Ease of maintaining good coolant temperatures and the successful application of refrigerated welding electrodes to a fairly wide range of thicknesses of aluminum and aluminum alloys are revealed. Refrigeration of the standard type electrodes is claimed to give the same general advantages in spot welding aluminum and aluminum alloys—but to a lesser degree—than has been reported with the "Frostpoints".

This electrode is so designed that its coolant tube concentrates all cooling effect in the electrode proper, eliminating losses caused by trying to refrigerate holders and welder arms. Each electrode is a permanent installation and is tipped with a quickly replaceable "Frostcap."

Mention R157 When Writing or Using Reader Service

NEW CUTTING GRADE CARBIDE

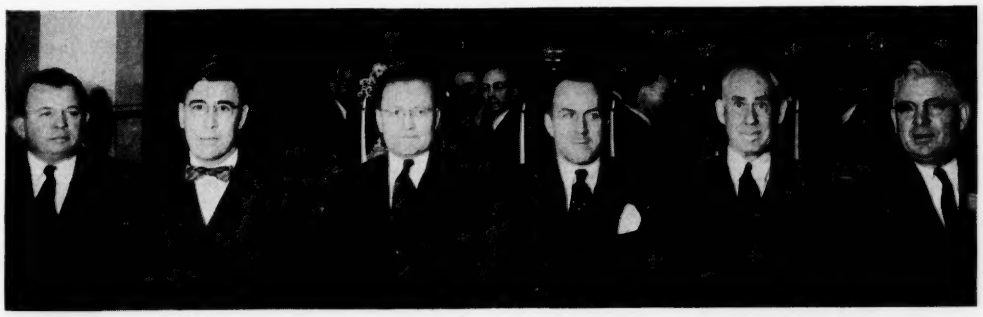
Willey's Carbide Tool Co.,
1340 W. Vernor Highway, Detroit 1, Mich.

A new cutting grade of carbide known as No. 710 has been announced by this company. Tested by various manufacturers over a period of several months, reports indicate it is superior to any steel cutting grades for machining tough alloy steels.

Mention R158 When Writing or Using Reader Service

More New Products on page 16

Columbus Chapter Hears Van Horn on Aluminum



Columbus Chapter Officers Lined up for This Photograph With National Vice-President Kent R. Van Horn and Past National President Oscar E. Harder on the Occasion of a Recent Meeting Addressed by Dr. Van Horn. Left to right are Charles Leibensperger, Columbus Sucker Rod Co., treasurer; Charles Greenidge, Battelle Memorial Institute, vice-chairman; Glen Krouse, Krouse Testing Machine Co., chairman; Dr. Van Horn, Aluminum Co. of America; Dr. Harder, Battelle Memorial Institute; R. E. Christin, Columbus Bolt Works Co., secretary. Dr. Van Horn spoke on "Metallurgy and Applications of Aluminum Alloys".

Differences in Moly Steels And 18-4-1 High Speed Shown

Reported by F. N. Meyer
Technical Supervisor, Waterbury Branch
American Brass Co.

New Haven Chapter—In developing the subject of "High Speed Steel," J. G. Morrison, metallurgist of the Landis Machine Co., drew on his wide experience in metallurgy and the handling of high speed steel to bring out many interesting and instructive facts at the meeting on Feb. 17.

He detailed the methods of heat treating, as related to the physical and chemical changes effected in the process, used to impart to the steel the qualities and properties so essential to efficient tool performance.

Fundamental differences in the behavior of the various types of molybdenum high speed steels which have been put on the market in the last few years were discussed. Mr. Morrison pointed out the relationship of the various types to each other and to the older and perhaps better known 18-4-1 tungsten high speed steel, covering their practical heat treatment.

One of the newer developments, the so-called sub-zero treatment, was touched on and the technique and some of the results obtained discussed.

Turning to the theoretical phases of the subject, involving the transformation of austenite to martensite, Mr. Morrison brought out the interesting theory that the practical heat treatment of high speed steels centers about the carbon atom.

Grossmann and Eisenman Visit Oregon

Reported by John E. Comfort
Pacific Metal Co.

Oregon Chapter — Officers' Night was opened by National Secretary W. H. Eisenman with a humorous account of his western trip with President Grossmann, and his farm problems engendered by labor shortage and Washington red tape. Bill's more serious message presented an up-to-date picture of the Society's success both from the members and the Government in the war emergency.

This brief talk was followed by National President Grossmann's lecture on "Principles of Heat Treatment"—a fundamental and practical presentation.

Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

Positions Open

DESIGN ENGINEER: For Ohio metal fabricator specializing in welded construction of corrosion resisting equipment; for redesign of existing products and development of new ones. Should have metallurgical experience, creative ability and at least four years of industrial experience. Engineering degree desirable though not essential. Draft exempt; age unimportant; permanent position. Box 4-5.

CHIEF METALLURGIST: For large eastern manufacturer of magnesium sand castings. Thoroughly experienced man to take charge of metallurgical department. Laboratory completely equipped with X-ray, chemistry lab, sand lab, spectroscope, metallographic equipment and physical testing apparatus. Applicant should have several years experience in aluminum and magnesium. State age, experience and salary wanted. Box 4-10.

SALES REPRESENTATIVE: Sales policy now being shaped by manufacturer of highly popular portable tensile tester. Most areas open. National advertising, excellent literature, quick delivery. Commission basis. Apply by letter, including non-returnable snapshot. Unless willing to include complete business record for our study, please do not apply. Box 4-15.

METALLURGIST: For magnesium foundry in Ohio, to supervise all sand controls and conduct exhaustive tests with respect to new and improved practices. State age, education, experience and enclose small photo if possible. Box 4-20.

METALLURGIST OR ENGINEER: For quality control. To be responsible for all inspection procedures for a highly rated company in Ohio manufacturing magnesium aircraft castings. Must be competent to read and interpret drawings and to supervise layout. Give complete record of experience, education, age, and enclose photo which will be returned. Box 4-25.

METALLURGICAL ENGINEER: Positions available in research and development on materials for chemical manufacturing plants. Experience in physical properties, stress analysis, corrosion, of alloys, ceramics, rubber and plastics. Age 26 to 35. Engineering degree required. State age, college, present employer, present and expected salary, and include inexpensive photograph. Box 4-65.

METALLURGIST: Familiar with materials inspection; able to supervise heat treating and welding and operate exceptionally well-equipped laboratory in plant making product of carbon, low alloy and stainless steels for power, petroleum, chemical, naval and marine industries. Development and production research. Chicago area. Highly critical war work; fine post-war possibilities; interesting work. Give experience, age, draft, and availability. Box 4-70.

SALES ENGINEER: New York area; manufacturer of specialized ferrous alloy products. Excellent post-war possibilities. Electrical engineering graduate or similar experience; proven sales ability. Draft exempt; certificate of availability. Applications from demobilized service men welcomed. State age, education and training, previous experience and salary expected and include photograph. Box 4-75.

Positions Wanted

PROCESS AND DEVELOPMENT ENGINEER: Graduate, seven years' industrial experience in both production and research; three years' supervisory experience. Familiar with processing practices for steel, aluminum, copper and brass, fabrication of automotive parts, refrigerators, stokers, chain, pumps, fans, aircraft, drums, and steel stampings. Good knowledge of heat treating, metallography, physical testing, and machining. Territory optional. Box 4-30.

METALLURGIST AND EXECUTIVE: Age 42, M.S., Ph.D. in metallurgy. Wide experience in production, research and development; many years in aluminum and magnesium; several years' college teaching experience. Wants metallurgical position in production or research, or executive position in a large organization having good post-war possibilities. Will also consider teaching in a good engineering college or university. Box 4-35.

MELTING SUPERINTENDENT: Ferrous metallurgy graduate, age 39; 15 years' melting experience, basic and acid. Box 4-40.

METALLURGIST: Wide experience in melting, rolling, foundry, forging, heat treatment and fabrication. Extensive contact experience. Desires connection with aggressive manufacturer. Would consider sales and service or production. Canada only; available under Regulation P.C. 246, Section 3. Box 4-45.

DEVELOPMENT ENGINEER: Young, draft-exempt engineer would like to become connected with reliable firm having post-war business. Would like to apply knowledge of metallurgy to problems of design and fabrication. Chicago. Box 4-50.

METALLURGICAL ENGINEER: Desires increased responsibility in research and development of coated electrodes for arc welding. Several years of productive experience in flux formulation on all types of steel rods. Signal ability with ferritic or austenitic stainless and a.c. work. Box 4-55.

HEAT TREAT SUPERVISOR, or engineering sales: Degree in chemical engineering; nine months additional study in ferrous and non-ferrous metallurgy. One year's experience in physical testing and metallography; three years as supervisor of heat-treat department. Draft exempt. Location middle west or west coast. Box 4-60.

STEEL FOUNDRY METALLURGICAL ENGINEER: 30 years' experience in all branches of steel casting production. Desires operating position in the middle south, southwest, or west coast. Box 4-80.

Metal Literature Review

23. INDUSTRIAL USES AND APPLICATIONS

(*Continued from page 13*)

23-89. Smooth Rolling. Chas. Nelson, Jr. *Die Casting*, v. 2, no. 3, March '44, pp. 18-19.
The combination of light weight, resiliency and strength, available in die castings, results in superior performance for another important industry.

23-90. Duplicating Duplicators. E. W. Peterson. *Die Casting*, v. 2, no. 3, March '44, pp. 25-27.
In these times particularly, those who design for production have the opportunity to take advantage of the many new technological improvements in materials and processes to do a better job than ever before.

23-91. How Plastic Tooling Speeds Production. John Delmonte. *Machine Design*, v. 16, no. 3, March '44, pp. 99-103.
Plastic tools do not possess the strength or mechanical durability of metal tools. Plastic tools can, under proper conditions, be produced at an appreciably lower cost and in much shorter periods of time. Cast plastic tools are successfully adapted to low-stressed form or contour blocks. Flat plates, bolsters and spacer blocks are made from sheet forms of plastics.

23-92. Selecting Plastic Nameplates. John W. Greve. *Machine Design*, v. 16, no. 3, March '44, pp. 112-114.
Plastics are replacing critical metals. Molded plates may be produced economically if the quantities are sufficiently large. Materials and procedures.

23-93. Choosing the Right Material. H. W. Gillett. *Machine Design*, v. 16, no. 3, March '44, pp. 115-119, 174-178.
The properties required of bearing materials in the light of recent developments and from the viewpoint of conserving strategic materials. Importance of proper testing and interpretation of results is stressed. General principles of special simulated-service testing of other materials are also covered.

23-94. Pressed Aircraft Pistons. *Aircraft Production*, v. 6, Feb. '44, pp. 85-92.
Description of the pressing technique and equipment adopted by Specialloid Ltd.

23-95. Standardization of Aircraft Tubing Proposed. John W. Offutt and David T. Marvel. *Steel*, v. 114, March 20, '44, pp. 84-85, 113.
Two hundred and five sizes will cover 95% of sizes required for airframes, although 328 sizes are ordered. Standardization of other aircraft types now regarded as desirable.

23-96. Measuring Errors in Involute Spur Gears. Sidney Cornell. *Iron Age*, v. 153, March 23, '44, pp. 68-73, 144.
In order to set up measuring standards for spur gears, the author presents a picture of an ideal gear which has no errors, and using this imaginary gear as a reference point skillfully presents a general classification of spur gear errors and outlines a method of recording and evaluating the deviations.

23-97. Production Problems in Small Parts Manufacture. C. P. Roberts and E. B. Neil. *Tool & Die Journal*, v. 9, March '44, pp. 89-93, 106-107.
The problems covered are based upon actual case histories taken from current production, and in most cases involve parts for aircraft or their components. Some emphasis has been placed upon the manufacture of aluminum parts since this metal not only is of the greatest importance in aircraft production but will have extensive post-war applications.

23-98. Iron Roll Manufacture. G. L. White. *Canadian Metals & Metallurgical Industries*, v. 7, March '44, pp. 16-20.
Well developed technique and close control essential to efficient production. Melting and molding process, hollow and special process rolls, finishing operations, roll characteristics.

23-99. Methods in the Production of the Sten Gun Magazine. *Machinery* (London), v. 64, Feb. 24, '44, pp. 197-202.
The magazine case is produced by spot-welding three steel pressings together.

23-100. Aluminum in the Canning Industry. *Light Metals*, v. 7, March '44, pp. 107-114, 115-116.
Aluminum as an improvement on tinplate; ultra-light alloys; historical; collapsible tubes and containers; improved collapsible container; the Bergerioux container; double-walled beer barrel; spiral seamed container; hair cream and office paste container; conical foil-lined paper containers for liquids; transparent collapsible containers; novelty packs; foil-covered glass containers; folding boxes of metallized board.

23-101. The Light-Alloy Motorcycle. "Slide Rule." *Light Metals*, v. 7, March '44, pp. 117-121.
Materials and methods which can be used with advantage by the competent amateur mechanic in search of increased performance.

23-102. Aluminizing Telescope Reflectors. *Light Metals*, v. 7, March '44, pp. 122-125.
Until recently, the production of metallic films on glass and other bodies by evaporation (and cathodic sputtering) was confined for technical reasons to objects of comparatively small area. The development, however, of high-capacity vacuum pumps has removed certain earlier difficulties and there is now virtually no size limitation in the application of the technique.

23-103. Sports Equipment Offers Big Chances for Light Metals. *Light Metals*, v. 7, March '44, pp. 127-130, 131-147.
A wide field of application for aluminum and magnesium alloys. Major items included in this section are tennis, golf, and winter sports.

23-104. The Twin-Engined Monoplane Albemarle I and II. *Metallurgia*, v. 29, Feb. '44, pp. 175-176.
Designed especially to meet what were, in the early days of the war, considered very real dangers (i.e., acute shortage of light alloys and other specialized aircraft materials, together with experienced aircraft manufacturing facilities), the Albemarle has been used for a variety of purposes, the most important being that of glider tug.

23-105. Effect of the War on Railway Car Development. E. D. Campbell. *Railway Mechanical Engineer*, v. 118, March '44, pp. 113-115.
New materials discussed—future of the freight car.

23-106. Develop Single Shield Wire H-Frame Design. *Electric Light and Power*, v. 22, no. 3, March '44, p. 63.
Saves 16,000 lb. of galvanized steel wire on first line. Other factors prevent adoption as standard practice in normal times.

NEW PRODUCTS IN REVIEW

FILTER MATERIAL

United States Rubber Co., Rockefeller Center, New York

Multipore, a filter material containing as many as 6400 perforations to the square inch, is now being used by chemical plants, iron mines, steel mills and other types of industry. A steel company is using a multipore filter in the flotation process of separating ore. In this severe service where fine, sharp particles of iron ore are separated, the conventional filter material lasted only a week, it is said. Multipore filter showed no signs of wear at the end of a month. After continuous use of almost two years, none of these filters has worn out.

Another important use is in silver plating the bearings of airplane engines. This, a new method, reduces plating time from 6 hr. to 1½ hr. In addition to speeding output, the new technique employing anode holders of multipore creates a silver plate of greater uniformity, with greater wearing quality, and a smoother surface.

Mention R159 When Writing or Using Reader Service

COMBUSTION CONTROL EQUIPMENT

Leeds & Northrup Co.,
4934 Stenton Ave., Philadelphia 44, Pa.

A new system of combustion control, said to make available to the smaller industrial power plant a regulation as effective and reliable as the company's system for large central stations, has recently been developed here.

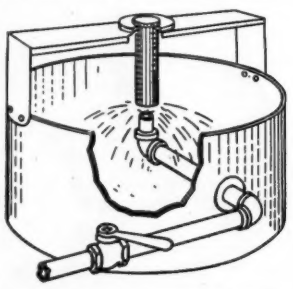
Applicable to boilers fired with coal, oil or gas, this system, known as Type P, continuously proportions fuel and air to steam demand, and at the same time, controls furnace pressure. To regular fuel-feed and draft, the system provides a simple electrical balance (using the Wheatstone Bridge principle) by which the settings of valves, dampers or vanes are varied in definite proportion to steam demand as directed by a master controller. Remaining draft damper or other device is simultaneously regulated by the furnace pressure controller.

Mention R160 When Writing or Using Reader Service

FIXTURE SIMPLIFIES JOMINY TEST

Claud S. Gordon Co., 3000 S. Wallace St., Chicago, Ill.

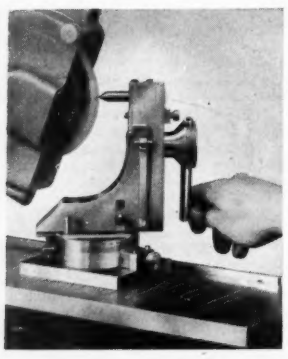
The fixture illustrated here, with special accessory tongs, is said to simplify the Jominy end-quench hardenability test. The sample is first normalized, machined to size and then heated to the proper quenching temperature for the steel being treated. It is then inserted in a hole in the fixture (see cutaway view illustrated) so that it hangs vertically on the flange, over a ½-in. round orifice which is ½ in. below the bottom end of the sample. The hole in the fixture will pass the bar but not the flange. Water comes through the ½ in. orifice with sufficient pressure to rise to a height of 2½ in. when the sample is not in place, this being controlled by a gate valve. The water, when making the test, is allowed to continue to flow until the sample is practically cold.



Mention R161 When Writing or Using Reader Service

DRESSING INSTRUMENT

J & S Tool Co., 477 Main St., East Orange, N. J.



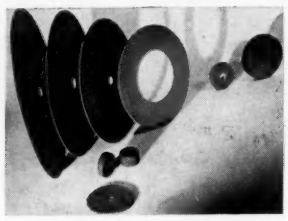
This radii and angle dresser offers added refinement and improvement upon the previous model and is cited as one of the finest precision dressing instruments obtainable. Most important feature is "fluid-motion" dressing, which eliminates chatter. Other features include automatic centering, 0.0001-in. accuracy, one setting for combined form of radius and angles, 14-in. wheel capacity, and durability and long service of the equipment. Moving parts are concealed, so that no dustplates are needed. It has a large radii range, from 0 to 3 in. concave and to 3 in. convex. It is easily and quickly operated and elaborate set-ups are said to be unnecessary.

Mention R162 When Writing or Using Reader Service

SYNTHETIC RUBBER CUT-OFF DISCS AND GRINDING WHEELS

A. P. de Sanno & Son, Phoenixville, Pa.

Case histories are said to prove that the new Radiac synthetic rubber cut-off discs and grinding wheels are superior in many respects to crude rubber discs and wheels. Radiac wheels and discs are advantageous for long wheel life, fast, free cutting, excellent finish and little burn. Company also points to improved wheel and disc appearance and quality, uniformity of bond, structure and composition. Wheels and discs are manufactured in the standard range of thicknesses and diameters up to 20 in. These wheels have shown effective performance on wet grinding of ball bearing races and roller bearings. Discs show remarkable fast cutting qualities on cold rolled and high speed steels.



Mention R163 When Writing or Using Reader Service

SPOT WELD TESTS

Streeter-Amet Co.,
4133 N. Ravenswood Ave., Chicago 13, Ill.

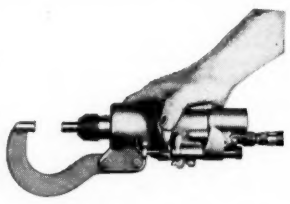
A "one-minute operation" now gives an accurate and complete check of the tensile strength of spot welds on thin sheet metal, according to engineers of this company. A thorough study of the S-A tensile tester, a machine made primarily to check the strength of veneers and thin plywoods, shows conclusively that the same device will do as complete and accurate a job on spot welded metals. Tests are simply and easily made. The sheet metal is dropped in the tester and held by a positive clamping action. Hydraulic pressure is smoothly applied and the breaking load in pounds pull is read directly from a dial, without computation. Another feature is that an operator of the machine needs no special training to do the work.

Mention R164 When Writing or Using Reader Service

AIR BUCK RIVETER

Ingersoll-Rand Co., Phillipsburg, N. J.

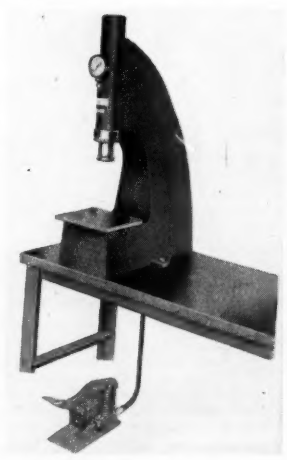
"A revolutionary development in aircraft riveters" is the claim made by this company in announcing this tool to manufacturers in aircraft and similar industries. By means of a yoke, it does its own bucking up, thereby requiring but one operator. It further simplifies the riveting operation by driving the driven head to a predetermined height, which is adjustable, then automatically shutting off when this height is obtained. It is said to be smaller and lighter than squeeze riveters of equal capacity. Two-stage throttle enables the operator to align or inspect the rivet with an initial, partial pressure before driving it home with full pressure. This riveter can be used wherever aluminum rivets up to 7/16 in. diameter must be driven and where a yoke-type tool can be used.



Mention R165 When Writing or Using Reader Service

HYDRAULIC PRESS

Reimuller Brothers Co.,
9400 Belmont Ave., Franklin Park, Ill.



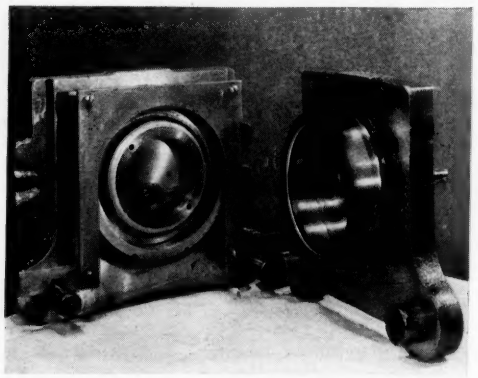
Rugged all-steel construction and simplified hydraulic foot control are outstanding features of this new press. It is designed for speedy and efficient handling of assembling, broaching, grooving, riveting, sizing, straightening, marking, forming and other small press operations. It is made in two models of 10 and 20-ton with 50% overload capacity. Only two levers are used in the hydraulic foot control—one applying even pressures of any degree, as rapidly or as slowly as desired; the other for release. Operator's hands are free for work. No outside airlines are needed. Other features are: Hollow large area ram for receiving punches, dies and other fixtures; ground ram; packless sealing rings; aircraft style piston-ring plungers; twin pressure gage.

Mention R166 When Writing or Using Reader Service

TOOL STEEL TUBING IN DIE MAKING

The Bissett Steel Co., 945 E. 67th St., Cleveland, Ohio

Tool steel tubing is being utilized in a great variety of ways in die making, this company points out, citing four different sizes used in the illustration. In the portion of the die shown at the left, the outside section of tubing is the blanking ring, the middle section is the pressure



pad, and the inner section is the draw stake. In the portion of the die shown at the right, one section of tubing was used to make a blanking and drawing ring. Sizes of tubing used in this die range from 14 in. to 10 in. o.d. The die blanks and forms small heater tops out of 20-gage cold rolled sheet in a single operation. If tool steel tubing had not been used, the die would have been made by forging rings to size and then machining them. In smaller dies, particularly with a deeper draw, the only other method would be to bore solid bars, which is expensive and time-consuming.

Tool steel tubing is most commonly substituted for bored bars in the manufacture of blanking dies, forming dies, punches, collets, collet closers, spindle thrust collars, lead screw thrust collars, rim rolls, hardened rolls, master tools, ring gages, bushings, slitters, spacers, skiving knives and machine tool parts. To make a part of tool steel tubing, it is only necessary to select the proper size of tubing, saw off the desired length, and then make any machining operations which are necessary to give the tube the contours required by the job.

Mention R167 When Writing or Using Reader Service

COATED ALUMINUM BRONZE ELECTRODE

Air Reduction Sales Co., New York City

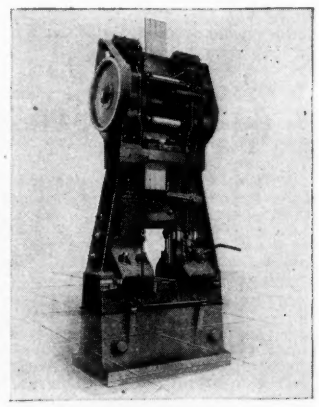
New coated aluminum bronze electrode, Airco No. 100, is announced by this company. This new, coated high tensile bronze electrode is a shielded arc electrode and can also be used as filler rod in carbon arc welding. It is said to produce welding deposits of great strength and hot ductility, combined with desirable resistance to corrosion. It is claimed that deposits are superior to standard manganese bronze with respect to corrosion resistance, and are equal to it in strength, hardness and ductility.

Mention R168 When Writing or Using Reader Service

BOARD DROP HAMMER

Erie Foundry Co., Erie, Pa.

The machine illustrated is a 7500-lb. four-roll board drop hammer with self-contained motor drive. Previously the largest board drop hammer that had been built was a 6500-lb. size. Present machine has been designed so that it can be built in a 10,000-lb. size. These machines are rated by the actual scale weight of the ram. The ram of this machine weighs 7500 lb. and the anvil 150,000 lb. However, all the other parts of the hammer are made so that they will be suitable to use with a ram weighing 10,000 lb. and an anvil weighing 200,000 lb., the only other change being a slight increase in the weight of the friction bar and the use of larger motors. In previous designs of four-roll hammers the motors were carried on each frame and the drive was upward from the motor sheave to the pulley. Motors were protected from shock by rubber mountings. In the present design, the motors are carried on top of the hammer, thereby avoiding the overhanging mountings. Motor cushioning is of all metallic construction, avoiding the use of rubber which might deteriorate.



Mention R169 When Writing or Using Reader Service

More New Products on page 18

Metal Literature Review—*Continued*

24. DESIGN

24-11. Truss-Type Fuselage Analysis with Graphical Solutions. Gail Swan and Richard H. Gade. *Product Engineering*, v. 15, March '44, pp. 185-189.
Application of the graphical method of joint analysis to determine distribution of weights, loads and inertia reactions of external loads in truss-type fuselages. The moment distribution method is applied for evaluating secondary bending effects resulting from deflection or eccentric forces between panel points. Typical solution diagrams are included.

24-12. Pneumatic Systems and Controls in Mechanical Design. E. E. Hewitt. *Product Engineering*, v. 15, March '44, pp. 174-177.
Basic systems and accessory valves for the control of force, proportional movement, sequence and timing through the application of air pressure in operational devices. Schematic diagrams of valve and piping arrangements are included. Possibilities inherent in pneumatic control applications are discussed.

24-13. Small Differences. W. A. Tuplin. *Machinery* (London), v. 64, Feb. 10, '44, pp. 149-151.
How to determine the value of a quantity that differs only slightly from one of the given quantities. Application to hot design.

24-14. Machine Structures and Continuous Girders. W. W. C. *Machinery* (London), v. 64, Feb. 3, '44, pp. 128-129.

24-15. Frequently Overlooked Factors in Design of Springs. A. M. Wahl. *Machine Design*, v. 16, no. 3, March '44, pp. 107-111.
Factors involved in design of helical compression springs. These factors include allowance for end turns, effect of eccentricity of loading, variations in modulus of rigidity, effects of cold setting, and stress at solid compression. 8 ref.

24-16. Redesigning to Utilize Stamping Process. Pt. II. Colin Carmichael. *Machine Design*, v. 16, no. 3, March '44, pp. 120-123, 180.
Complete redesign of a self-contained machine discussed. Indicating what can be done on a smaller scale, the redesigned pyrotechnic pistol illustrated affords an interesting example. The original pistol, made primarily from machined castings, cost $34 complete with mount. The new design, utilizing steel stampings extensively, cost $11 and weighed 40% less. Much of the saving in cost is due to the adaptability of the stamping process to low-cost mass production.

24-17. A New Slant on Sheet-Metal Fastenings. E .S. Jenkins. *Machine Design*, v. 16, no. 3, March '44, pp. 131-136, 160.
Existing roles contradicted; load distribution affected by stiffness; measuring the deformations; rivet and spotweld stiffness compared; rivet loads more uniformly distributed; continuous joints precisely analyzed, comparing induced stresses; high stresses found in cement and importance of tear-stresses.

24-18. Built-up Design Cuts Costs 20%. G. W. Birdsall. *Steel*, v. 114, March 20, '44, pp. 88-90, 92.
Ingenious use of tubing with formed, sized and welded plate has many production advantages, reduces cost more than 20%. This type of design with its wide range of application is believed to have considerable postwar significance.

24-19. Tubular Assembly Fixtures. *Aircraft Production*, v. 6, March '44, pp. 149-150.
Notes on an American trend in the design of production equipment.

25. MISCELLANEOUS

25-46. Organization of the Manufacture of Parts. D. Tiranti. *Aircraft Engineering*, v. 16, Jan. '44, pp. 21-24.
Detail arrangements necessary for the control and progress of work in the shops.

25-47. Gravity Conveyor System. Harvey Sellers. *Steel*, v. 114, Feb. 28, '44, pp. 116, 118, 121.
Materials handling at Ohio Crankshaft Inc.

25-48. Conveyorized Fixtures. *Steel*, v. 114, March 6, '44, pp. 120-122, 124.
Eliminate time-consuming practice of repeatedly changing work from jig to jig as fabrication progresses down the line, for wing remains in the same fixture until it is completed.

25-49. Industrial Training Speeds Rehabilitation. *American Machinist*, v. 88, March 2, '44, pp. 97-98.
Convalescing service men need activity, exercise and training. Arma Corp. combined these needs and now trains service men while they recuperate.

25-50. Little Savings Make Big Ones at G.E.'s Fort Wayne Works. *Modern Industrial Press*, v. 6, Feb. '44, p. 28.
At Fort Wayne works of the General Electric Co. large savings in material, machine hours and man hours and consequent increases in war production, are being achieved by a series of small improvements.

25-51. Battelle Memorial Institute. B. D. Thomas. *Mining & Metallurgy*, v. 25, March '44, pp. 163-166.
Fifteen years of continuous expansion has made this commercial research organization pre-eminent in the metallurgical and engineering world.

25-52. Gettering and Getters. *Light Metals*, v. 7, Feb. '44, pp. 77-80, 81-94.
Account of the physics and chemistry of reagents, and techniques, for cleaning up high vacua. Survey of the patent literature.

25-53. Information Exchange. B. Kaiser. *Aircraft Production*, v. 6, Feb. '44, pp. 68-70.
Effects of specialization: Need for a central bureau of technical information.

25-54. Small-Scale Assembly. L. H. Whatley. *Aircraft Production*, v. 6, Feb. '44, pp. 79-84.
An interesting application of quantity-production methods to the assembly of intricate mechanism.

25-55. Practical Postwar Planning Charts Course for Executives and Engineers. Paul G. Hoffman. *Industry & Power*, v. 46, March, '44, pp. 70-71, 140.
Although much technical information on reconversion and planning for the postwar period cannot yet be released, the definite steps taken by some pioneering companies indicate procedures industrial organizations can follow to have their departments ready in minimum time.

25-56. Dow Magnesium's Newest Power Plant Is Rushed to Completion. H. E. Hollensbe. *Industry & Power*, v. 46, March '44, pp. 57-61.
Two 225,000 lb. per hr. boilers, pulverized coal fired, and two 7500-kva condensing turbine-generators installed and placed in operation in remarkably good time, despite wartime delays, priorities, etc.

25-57. Practical Application of Automatic Control Equipment. W. H. Steinkamp. *Industry & Power*, v. 46, March '44, pp. 68-69, 140.
Types of control instruments and the factors—such as control medium, power source reliability, location, and cost—that should be considered in selecting apparatus for a particular job.

25-58. The Work of the Joint Research Committees. *Metallurgia*, v. 29, Jan. '44, pp. 149-151.
Joint Committees of the Iron & Steel Institute and the British Iron & Steel Federation, and report to the Iron & Steel Industrial Research Council. A review of their work convering the period 1924-1943.

25-59. Forecasting Tool and Gage Requirements. Sergius D. Brootskoos. *Iron Age*, v. 153, March 9, '44, pp. 46-51.
Formulas in which are substituted symbols for figures that should be used to forecast tool purchases.

25-60. Polythene—a New du Pont Plastic. *Iron Age*, v. 153, March 9, '44, p. 51.
Plastic manufactured by the polymerization of ethylene.

25-61. New Polyvinyl Resins Developed. *Iron Age*, v. 153, March 9, '44, p. 67.
Geon No. 202 and 203 are new vinyl chloride, vinylidene chloride copolymers, different from any of the others previously developed.

25-62. Injection Moulding and Tools for Plastics. *Machinery* (London), v. 64, Feb. 10, '44, pp. 157-159.
Injection moulding of thermosetting materials similar to that of pressure die-casting by the cold chamber method.

25-63. Computations for Cooling by Oil-Hydraulic Means. H. W. Hamm. *Product Engineering*, v. 15, March '44, pp. 151-153.
Design calculation data are given for cooling equipment for hydraulic transmissions, bearings, oil pumps and couplings. Formulas are intended to enable engineers to deal accurately and readily with the more common thermodynamic problems.

25-64. Wartime Designs. *Product Engineering*, v. 15, March '44, pp. 160-161.
Radio-frequency gun "spot-glues" wood. Cold-coining reduces cost of parts. High-altitude combustion-type airplane heater.

25-65. New Plastic Compounds Improve Shock-Resistant Parts. F. J. Donohue and C. H. Whitlock. *Product Engineering*, v. 15, March '44, pp. 178-181.
Presenting developments in combinations of plastics resins with macerated fabric, cotton-cord, sisal fiber and wood-pulp fillers for molding materials. The resins used are phenolic and melamine.

25-66. Properties of Polyethylene Suggest Peacetime Applications. *Product Engineering*, v. 15, March '44, pp. 202-203.
Properties and characteristics that indicate the usefulness of this newest thermoplastic material for special applications are discussed and several examples of products that can be fabricated from it are given.

25-67. Preferred Aeronautical Steel Specifications. *Steel*, v. 114, March 13, '44, pp. 104, 107-108.
Revised list of aeronautical specifications.

25-68. Materials Handling Innovations. *Steel*, v. 114, March 13, '44, pp. 116, 143.
Two recent developments utilized to speed the movement of vital supplies. The "Boone car-plate lifter" is a device which enables the easy transportation, placing and handling of the extremely heavy and cumbersome steel plates used as ramps between freight cars and loading platforms.

25-69. Sawing Fixture Ups Output 933%. *Tool Engineer*, v. 13, March '44, p. 76.
Production snag relieved by ingenious, low-cost tooling.

25-70. Scientific Methods of Distribution. Fenton B. Turck and William E. Hill. *Mechanical Engineering*, v. 66, March '44, pp. 183-191.
Engineering technique as applied to the marketing of the products of twelve industrial companies.

25-71. Clean Air in the Shop. Bartlett West. *Modern Machine Shop*, v. 16, March '44, pp. 190-192, 194, 196, 198, 200.
Efficient device has been developed to keep shop air clear and clean of oil-mist, dust and smoke.

25-72. Ingenious Mechanical Movements. Charles F. Smith. *Machinery*, v. 50, no. 7, March '44, pp. 203-204.
Mechanisms selected by experienced machine designers as typical examples applicable in the construction of automatic machines and other devices.

25-73. Production Control in Aircraft Engine Manufacture. Paul J. Bastian. *Machinery*, v. 50, no. 7, March '44, pp. 205-208.
Records of progress of work, application of the system to gear production.

25-74. Fluorspar. H. T. Mudd. *Mining Congress Journal*, v. 30, Feb. '44, pp. 103, 127.
Metallurgical grade, acid grade.

25-75. The Jig and Tool Efficiency Engineer. H. S. *Machinery* (London), v. 64, Feb. 24, '44, p. 203.
Accepts complete responsibility for the efficiency, care and maintenance of all jigs, fixtures and special tools, immediately they are passed by the tool-inspection department. Outline of duties, small or urgent jobs, authority needed.

25-76. The Hazards of Carbon Monoxide: III. Frank S. Rossiter. *Industrial Heating*, v. 11, March '44, pp. 388, 390, 392.
Sources of the gas, its effects on the human system when absorbed, methods of resuscitation of gassed individuals, and methods for testing for the presence of CO in the atmosphere.

25-77. New Plant for Purification of Coke Oven Gas. *Industrial Heating*, v. 11, March '44, pp. 410, 412, 414.
Ford sulphur extraction plant.

25-78. Shop Equipment and Small Tools. *Aircraft Production*, v. 6, March '44, pp. 129-130.
Modern aids to efficient production.

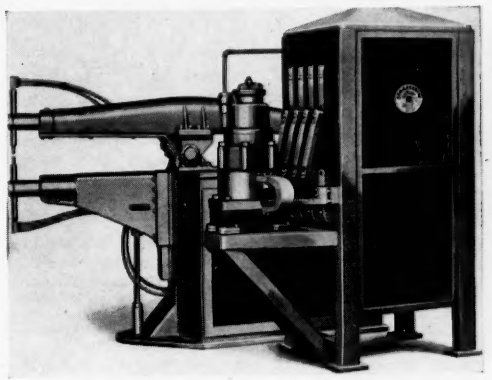
(Continued on page 18)

NEW PRODUCTS

"STORAGE BATTERY" WELDER

Progressive Welder Co.,
3050 E. Outer Drive, Detroit 12, Mich.

What is believed to be the first practical direct current resistance welder using storage batteries as a source of welding current has been announced by this company. Equipment is already in use, welding aluminum for aircraft assemblies. Actually, the use of batteries as a source of "stored energy" for resistance welding involves no radical re-design of already available welding machines, since modified types of Progressive Welder machines or guns may be used in combination with the storage battery



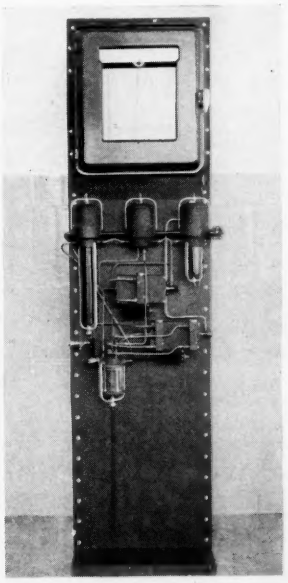
power unit. It does make possible, however, the application of resistance welding even in aluminum, in localities where power supply limitations have prevented the use of other forms of stored energy welders. The only requirement is sufficient power to operate a battery charger. Compared with other forms of stored energy welders, furthermore, the use of batteries for the power source means a material reduction not only in initial cost of the welding installation but also in operating costs, particularly as to current consumption, maintenance costs and supervisory requirements. Other advantages of the use of storage batteries for welding reported by this company include elimination of inductive losses in the welding "loop" by use of direct current; elimination of reactance losses between power supply and electrodes; less critical adjustments to get consistently good welds; and greater operating and maintenance simplicity.

Mention R170 When Writing or Using Reader Service

GAS ANALYSER

Cambridge Instrument Co., Inc.,
3732 Grand Central Terminal, New York

A new gas analyzer has been built by this company for a large metallurgical plant where it will be used for determining the percentages of O_2, CO_2, CO and H_2 simultaneously, and continuously recording the amounts on a single chart. In a recent demonstration a small bunsen burner flame was used and continuous records immediately indicated the varying percentages of four different gases in any chosen zone in the flame. Explorations were easily made with a quartz sampling nipple connected to the analyzer by a flexible tube.



Chemists, metallurgists, oil refiners and other engineering executives may find much of interest in this new industrial 4-point gas analyzer. It provides simultaneous analysis and continuous graphic record of the amounts of oxygen, carbon dioxide, carbon monoxide and hydrogen in a sample of combustion products. Chemicals, fragile glassware and moving parts in the analysis unit are eliminated. The instrument is useful in processes wherever knowledge of the amounts of the gases mentioned is required. Its use enables close control in chemical processes, oil refining and in the operation of various types of kilns, inert gas producers, furnaces in the metallurgical industry and other combustion processes. The complete analyzer operates directly from the alternating current supply line. The recorder may be located at any required distance from the sampling point.

More New Products on page 18

Metal Literature Review

25. MISCELLANEOUS

(*Continued from page* 17)

25-79. **Pumps for Carbonization Plants.** *Metallurgia*, v. 29, Feb. '44, p. 180.
A special centrifugal design for use under difficult conditions.

25-80. **British Owned German Patents.** S. T. Madeley. *Metallurgia*, v. 29, Feb. '44, pp. 181-182.
Under present conditions difficulties frequently arise regarding the position of enemy patents which are substantially British owned. The author endeavors to clarify the position and explains that such patent rights granted and pending are not being revoked or permanently taken over by the state.

25-81. **Steel Plant Laboratories.** *Canadian Metals & Metallurgical Industries*, v. 7, March '44, pp. 24-26.
Facilities for chemical and metallurgical control at Atlas Steels, Ltd.

25-82. **Achievements and Post-War Plans.** *Canadian Metals & Metallurgical Industries*, v. 7, March '44, pp. 26-28, 44.
Engineers put faith in private enterprise, scientific methods and research.

26. STATISTICS

26-23. **Development of the Mineral Industry in Peace and War.** J. R. Finlay. *Mining & Metallurgy*, v. 25, March '44, pp. 156-162.
What recent history teaches us in making plans for production in the next two decades.

26-24. **Difficult Problems Met in Supplying Raw Material for New Geneva, Utah, Steel Plant.** *Mining & Metallurgy*, v. 25, March '44, p. 169.
Statistical information dealing with total steel capacity, iron ore deposits, furnaces and refractories.

26-25. **The Metal Market After the War.** W. C. Hirsch. *Automotive and Aviation Industries*, v. 90, March 1, '44, pp. 17-18, 56.
Production figures on steel capacity. Finished steel, Al and Mg production.

26-26. **Aluminum Ore and Metal Now Being Stockpiled.** Philip D. Wilson. *Metal Progress*, v. 45, March '44, pp. 473-477.
Official statement of the present situation of aluminum.

26-27. **Postwar Steels Should Conserve Valuable Alloying Elements.** Charles M. Parker. *American Machinist*, v. 88, March 16, '44, pp. 97-100.
With vital steel alloying elements found scattered over the face of the globe we must design weapons using materials available within this continent.

26-28. **China's Infant Heavy Industry.** *Iron Age*, v. 153, March 16, '44, pp. 64-65.
Free China is adapting smelter and furnace designs from the earlier days of American and European iron and steel production. Ferrous and other heavy industry output, while small, has grown swiftly in the past two years.

26-29. **Copper Production Picture for 1943 and 1944.** F. H. Hayes. *Mining Journal*, v. 27, Feb. 29, '44, pp. 5-6.
Although the 1943 copper production was the greatest in the history of the United States, there is a possibility that 1944 copper production may establish another record. This is due to the fact that greater output will come from some of the projects completed in 1943 or to be completed early in 1944, thus more than offsetting decreases expected in some of the operating mines.

26-30. **Progress of the Zinc Industry.** Myron L. Trilsch. *Mining Journal*, v. 27, Feb. 29, '44, pp. 7, 29-30.
The major task confronting the zinc industry in 1944 will be to adjust production to military requirements and essential civilian needs. This will require a decision as to the size of stockpile desirable for national security. The Zinc Division, WPB, proposes two methods for regulating the stockpile: Curtailing domestic mine output, and increasing consumption of zinc by relaxation of restricted uses.

26-31. **Some Major Problems in the Field of Minerals and Metals.** Arthur H. Bunker. *Mining Congress Journal*, v. 30, Feb. '44, pp. 51-55, 97.
Progressive formulation of national mineral policies to meet the requirements of global war; stockpiling and development of mineral reserves for the future.

26-32. **Copper Meeting Essential Requirements.** F. H. Hayes. *Mining Congress Journal*, v. 30, Feb. '44, pp. 56-58.
Domestic production reaches record level and industry is set for a slight increase in 1944, if required.

26-33. **Lead Holds Its Own.** E. Vogelsang. *Mining Congress Journal*, v. 30, Feb. '44, pp. 58-59.
Firm domestic production is indicated to assure supply-demand balance.

26-34. **Current Zinc Outlook.** M. L. Trilsch. *Mining Congress Journal*, v. 30, Feb. '44, pp. 59-61.
Stabilized demand for zinc shifts industry's problem to curtailed production, increased stocks or relaxation of restricted uses.

26-35. **Iron Ore Wins Another Service Stripe.** M. D. Harbaugh. *Mining Congress Journal*, v. 30, Feb. '44, pp.
The iron ore industry assures the nation its most basic war material, continues its technologic progress and foresees continued heavy demands both for war and post-war construction.

26-36. **Bauxite Alumina and Aluminum Ingot.** James L. Head. *Mining Congress Journal*, v. 30, Feb. '44, pp. 71-72.
Source, capacity and production, and uses discussed.

26-37. **Magnesium.** Perry D. Helser. *Mining Congress Journal*, v. 30, Feb. '44, pp. 72-73.

26-38. **The Versatility and Prestige of Silver.** Pat McCarran. *Mining Congress Journal*, v. 30, Feb. '44, pp. 74-77, 102.
Its new war and industrial importance results in unprecedented demand reducing U. S. stocks. Position advances in coming stabilization of world currencies.

26-39. **Gold Mining Hard Hit.** Merrill E. Shoup. *Mining Congress Journal*, v. 30, Feb. '44, pp. 78-81.
With operations suspended by government edict, the industry finds itself between the "devil and the deep blue sea," but looks confidently to a bright future.
1943 production up 275%.

(Continued on page 19)

NEW PRODUCTS IN REVIEW

HELIUM-SHIELDED ARC WELDING ELECTRODE HOLDER

General Electric Co., Schenectady, N. Y.

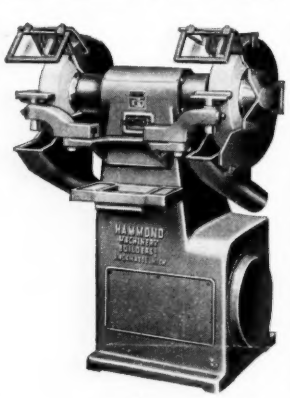
A new helium-shielded arc welding electrode holder for manual operation, for use with either helium or argon gas, is specially designed for use in the welding of light metals where precise heat control and protection from the oxidizing effect of the air are required. The holder is light and consists of a comfortable Textolite handle, a steel gas nozzle, and a copper electrode clamp fitted with a tool steel spring collet. The gas nozzle is designed to give maximum coverage with minimum gas consumption, and to avoid obstructing the operator's view of the arc. The electrode clamp is constructed to hold a tungsten or a carbon electrode until all but a ¾-in. stub is consumed.

Mention R172 When Writing or Using Reader Service

MAGNESIUM GRINDERS

Hammond Machinery Builders, Inc.,
1647 Douglas Ave., Kalamazoo, Mich.

Newly equipped grinders for magnesium have just been announced by this company. Ten-inch, 12-in., and 14-in. grinders are equipped as illustrated with heavy plate-wheel guards which have direct exhaust outlets (no pockets) for connection to dust collecting system. Machines are also equipped with explosion-proof electrical equipment. Other grinders in the Hammond line can also be similarly equipped for magnesium grinding. These grinders, it is said, are equipped with larger oversize spindles for smooth vibrationless operation, larger bearings sealed against ingress of dust and grit, multi V-belt drive so any desired spindle speed may be obtained. The functionally engineered design of the base pedestal permits use of any standard make of motor—an advantage when companies have standardized on motor equipment.



Mention R173 When Writing or Using Reader Service

SATINY FINISH

Kelite Products, Inc., 909 E. 60th St., Los Angeles, Calif.

Kelite reports that a satiny finish on zinc or cadmium plated surfaces can be achieved by a quick dip in a dilute solution of hot KeWax immediately after plating. This operation is said to have proven highly successful in finishing tools for the Navy.

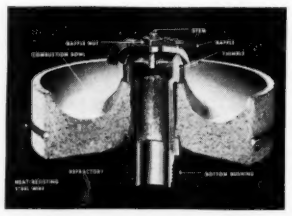
Mention R174 When Writing or Using Reader Service

"INFRA-RED" PAINT DRYING WITH GAS

Burdett Manufacturing Co., Chicago, Ill.

Discussing results obtained with the refractory type "Infra-Red" burners, Wm. H. Tesmer, chief engineer of this company, says that when employed with a recirculating system as in paint drying, this type burner will offer decided advantage such as 90% lower fuel cost. It will provide up to 300% increase in production, as compared with other methods of drying without reformulation of paints.

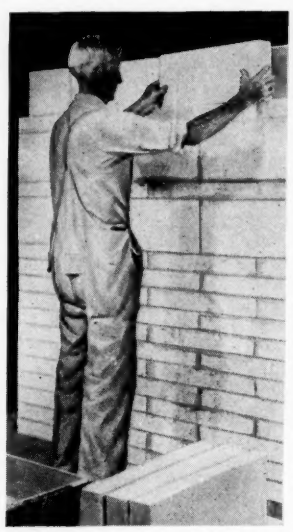
In the case of ammunition chests and similar metal chests, the refractory type burner is said to dry the inside finish with equal speed and thoroughness as the outside, simultaneously. Similarly wrinkle, hammerloids, clear, black and white finishes can be run through side by side, in the use of refractory type burners, with perfect results requiring no change of speed or temperature. With this burner, the recirculation of hot air not only aids the speed of production, reducing fuel consumption at the same time, but provides a pure oven atmosphere continuously drawing all foul air out. Temperature from 150 to 550° F. can be obtained by merely resetting temperature controllers allowing a wide range of temperature and types of production without changing speed of conveyor.



Mention R175 When Writing or Using Reader Service

INSULATING FIREBLOK

Johns-Manville, 22 E. 40th St., New York, N. Y.

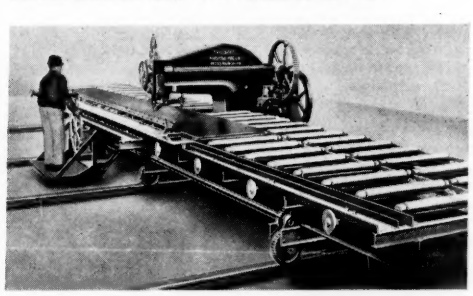


This new insulating Fireblok is similar in composition and properties to the other J-M insulating firebrick and is suitable for the same range of temperature conditions. But one Fireblok will cover more surface than five full-sized firebrick. It is manufactured in sizes 9x24 in., 9x12 in., 4½x24 in., 4½x 12 in. Standard thicknesses are 2½ in., 3 in. and 4½ in. Special sizes and thicknesses are available. This large size and light weight assure fast, economical installation. It is easily cut and shaped, so that inventory of special shapes can be reduced. Number of joints is reduced resulting in a thermally more efficient construction and requiring a minimum of mortar for bonding. Fireblok comes in four grades.

Mention R176 When Writing or Using Reader Service

PLATE AND PUNCH TABLE

Thomas Machine Mfg. Co., Pittsburgh 23, Pa.



In use at Pearl Harbor, this high precision plate and punch table has been playing an important part in the unequaled speed with which our damaged ships are repaired. Said to be unique in the plate punch field, tables such as shown above were ordered by the Navy less than a month after the Jap attack of Dec. 7, 1941. They have a capacity for hull plates up to 1 in. thick and 8x30 ft.

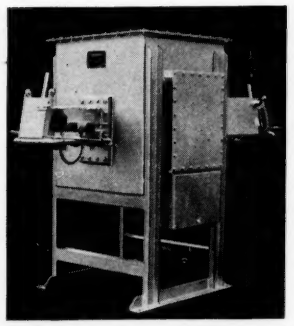
Outstanding among patented features of the tables is the attachment of the plate by quick acting clamps to a heavy channel section carriage, insuring positive movement of the plate longitudinally, independent of friction or difficulties encountered with friction drives when plates are warped. This also permits spacing attachments for accurate and rapid spacing of holes longitudinally or crosswise, eliminating marking entirely, or the first plate punched may be used as a template.

Mention R177 When Writing or Using Reader Service

SINTERING FURNACES

Harper Electric Furnace Corp., Niagara, Falls, N. Y.

A line of high temperature electric furnaces for sintering powdered metal at temperatures between 1800 and 2750° F., is announced by this company, with the comment that these furnaces put the manufacture of powdered metal products on a mass production basis. They are equipped with a preheat tunnel leading to the high temperature chamber and a water-jacketed cooling chamber. Entrance to the preheat tunnel and the exit on the cooling tunnel are equipped with automatic flame curtains. Gas-tight construction permits use of protective atmospheres, such as hydrogen, dissociated ammonia and mixtures of carbon monoxide, hydrogen and nitrogen. Extremely accurate temperature control and maximum life of heating elements are provided. Furnaces are built in sizes ranging from laboratory to volume production requirements.



Mention R178 When Writing or Using Reader Service

More New Products on page 19

Metal Literature Review—*Continued*

26. STATISTICS

(*Continued from page* 18)

26-40. Antimony Production Ample for Needs. L. G. Matthews. *Mining Congress Journal*, v. 30, Feb. '44, p. 82.
Supply-demand situation eases, resulting in removal of allocation control and restrictions on Jan. 1, 1944.

26-41. Quicksilver Meets All Wartime Requirements. S. H. Williston. *Mining Congress Journal*, v. 30, Feb. '44, p. 83.
Sources and production.

26-42. Ferro-Alloy Metals. Frank Hatch. *Mining Congress Journal*, v. 30, Feb. '44, pp. 84-85.
Control of shipping lanes from foreign production sources and drop in projected alloy steel program and threatened shortages.

26-43. Mercury, Silver and Miscellaneous Minerals. Richard J. Lund. *Mining Congress Journal*, v. 30, Feb. '44, pp. 86-88, 102.
Production and consumption.

26-44. A Post-War Mineral Control Policy. Geo. B. Langford. *Canadian Mining and Metallurgical Bulletin*, no. 383, March '44, pp. 114-138.
Mineral resources; general considerations concerning mineral resources; conservation and utilization of mineral resources; trends in industrial development; cartels in the mineral industry; proposed policy for the mineral industry; need for stabilizing industry.

26-45. Aluminum at War. W. C. Devereux. *Metallurgia*, v. 29, Feb. '44, pp. 183-188.
The vital importance of metallic materials in wartime is well known, the quantity of supplies available, and the ability to make the best possible use of them, determine the extent to which a country can wage war, whether in defense or attack. An informative picture of aluminum at war which indicates tremendous possibilities for this material in post-war production in practically every section of industry.

26-46. The British Aluminum Industry in War-Time. George Mortimer. *Metallurgia*, v. 29, Feb. '44, pp. 189-197.
How aluminum met the demands of a change from peace to war conditions. The possibilities of the industry when peace returns; after the severe service suitable aluminum alloys have successfully withstood under war conditions, the position of the industry should then be assured.

26-47. Investigations of Mercury Deposits. McHenry Mosier. *Mining Technology*, v. 8, March '44, T. P. 1697, 9 pages.
Mercury is one of the strategic metals of which the supply has been raised from critical uncertainty to more than enough for essential demands. Stocks are now adequate, domestic production (currently at the rate of 50,000 flasks per year) is gradually being curtailed through Government control of labor and operating supplies.

27. BIBLOGRAPHY

27-15. Technology of Magnesium and Its Alloys. Adolf Beck. 2nd Ed. F. A. Hughes, London. $10.00.

27-16. Magnesium. Lilian Holmes Strack. Harper & Bros., New York. $1.00.

27-17. Steel in Action. Charles M. Parker. Jacques Cattell Press, Lancaster, Pa. $2.50.

27-18. Successful Soldering. Louie S. Taylor. 1st ed. McGraw-Hill Book Co., New York. $0.80.

27-19. Quin's Metal Handbook and Statistics, 1941-1942. Metal Information Bureau, Ltd., London. 10s.

27-20. The Oxy-Acetylene Handbook; A Manual on Oxy-Acetylene Welding and Cutting Procedures. Linde Air Products Co., New York. $1.50.

27-21. Tungsten. K. C. Li and C. Y. Wang. Reinhold Publishing Co., New York. $7.00.

27-22. Materials and Processes. J. F. Young. 628 pp., illus., John Wiley & Sons, Inc., New York. $5.00.
The selection and use of materials in design engineering, including an analysis of forging, casting and heat treating.

27-23. Plastic Working of Metals and Non-Metallic Materials in Presses. E. V. Crane. 3rd ed., 540 pp., illus., John Wiley & Sons, Inc., New York. $5.00.
How and why plastics and metals move and are moved. Planning operations, dies and molds, illustrations of tools, equipment and methods.

27-24. Aircraft Production Illustration. George Tharratt. 201 pp., illus., McGraw-Hill Book Co., New York. $3.50.
A manual of perspective layout and technical sketching. It explains the system of making simple three-dimensional pictures for the purpose of interpreting engineering drawings to assembly-line workers who are not capable of reading blueprints. The book includes a brief account of the development of this technique and an explanation of its value in systematizing and speeding production.

27-25. Blueprint Reading; Understanding Shop Practices. Fred Nicholson and Fred Jones. 141 pp., illus., D. Van Nostrand Co., New York. $2.25.
For most lessons in this book, the student has before him pictorial illustrations of a machine tool, an expository text on its uses, a reproduction of a blueprint requiring the use of the tool, and questions pertaining to the blueprint. An introductory textbook for classroom use, but useful also for self-instruction.

27-26. Electron-Optics. Paul Hatschek; translated by Arthur Palme. 161 pp., illus., American Photographic Publishing Co., Boston. $3.00.
A non-mathematical discussion of electrons and electron beams, their production, refraction and application in such devices as television tubes. The German original was published in 1937. The electron microscope and other recent applications are treated briefly in a final chapter by the translator.

27-27. Handbook on Designing for Quantity Production. Herbert Chase. 517 pp., illus., McGraw-Hill Book Co., New York. $5.00.
Technical data and practical "know-how" on the design of parts for economical production by the important processes for quantity production such as die casting, sand casting, forging, plastic molding, together with discussions of the factors to be considered in choosing among the various processes.

27-28. Materials Handbook. George S. Brady. 5th ed., 765 pp., McGraw-Hill Book Co., New York. $5.00.
An encyclopedia for purchasing agents, engineers, executives, and foremen. 150 new materials added since previous edition. Appendix contains new tables, lists of terms, and series of maps showing world production areas.

27-29. Aircraft Sheet Metal Work. C. A. LeMaster. 387 pp., illus., American Technical Society, Chicago. $3.75.
How to do blueprint reading, template layout, patterns for bends, riveting, soldering, brazing, welding, drop hammer work.

27-30. The Metallography of Meteoric Iron. Stuart H. Perry. 206 pp., illus., paper, Bulletin 184, Government Printing Office, Washington, D. C. 60c.

27-31. Practical Metallurgy for Engineers. Research Staff of E. F. Houghton & Co. 4th ed., 479 pp., illus., Houghton Press, Philadelphia. $3.00.

27-32. Guide to Weldability of Steels. 90 pp., tables and charts, American Welding Society, 33 West 39th St., New York 18, N. Y. $1.00.
In two parts: Part I is designed to be an explanation of the system proposed for the predetermination and preservation of desired ductility in the heated zone of higher carbon and low alloy steels during welding. Part II is an instruction manual, with step-by-step examples showing the use of the system to select steels and to predict welding conditions necessary for the preservation of desired ductility in the heated zone.

Materials Index

To the Metal Literature Survey

THE FOLLOWING tabulation classifies the articles annotated in the preceding pages according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

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NEW PRODUCTS

OIL BATH FURNACE

Stanwood Corp., 4819 W. Cortland St., Chicago 39, Ill.

A compact but heavy duty oil bath furnace has been announced by this company. These furnaces rapidly and effectively temper or draw small parts to relieve stresses set up by quenching or to bring about a change in grain structure. Gas fired, these units are heated by immersion tubes for maximum thermal efficiency and quick pickup. Super-power burners are used and are completely enclosed, being readily accessible through the door in the front of the unit. Thermostatic control assures accurate temperatures. Units can be equipped with right or left-hand drain boards, pitched so oil flows back into bath. Square or cylindrical baskets for holding parts to be tempered or drawn are available for use with these furnaces.

Mention R179 When Writing or Using Reader Service

DEVICE DETECTS OXYGEN AND WATER VAPOR IN FURNACE GASES

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Oxygen, if present in heat treating atmospheres for steels, will rob the surface (sometimes even the interior) of carbon, ruining the surface finish and softening the steel. Water vapor at heat treating temperatures decomposes into hydrogen and oxygen, and also appears to act as a catalyst in aiding decarburization. Presence of unwanted oxygen and water vapor in heat treating atmospheres is detected by passing the gas over a cool surface and by noting the temperature at which condensation occurs—the dew point of the gas. Now an experimental device developed by Westinghouse utilizes electrons to do the detecting.

The electrons furnish a continuous report of their findings to the operator. Oxygen and water vapor are ionized by electron bombardment, whereas constituents of furnace gases are not. The arrangement draws a sample of the gas mixture past an electron gun. As long as the gas is free of impurities, the electron current is constant. However, when oxygen or water vapor is mixed with the gas, some of the electrons are utilized in forming negative ions. This causes a measurable decrease in electron current. Thus this electronic dew point indicator removes the difficulty of judging visually determined dew points, a method subject to considerable variation. At present the new development is strictly a laboratory instrument and is not commercially available.

Mention R180 When Writing or Using Reader Service

EYE SAVERS

Watchemoket Optical Co., Inc., Providence 3, R. I.

A rugged, new, all-plastic goggle for general industrial utility is offered by this company. One-piece lens is of shatterproof methacrylate that withstands heavy impact, is highly resistant to pitting caused by sparks. Unique construction permits easy replacement of low-cost lens. Non-fogging, the goggle is reinforced with high-brass clip at bridge. Specify Model 7, or mention item number, in writing for samples and price.

Mention R181 When Writing or Using Reader Service

SAWDUST CLEANING COMPOUND

Interstate Aircraft & Engineering Corp.,
3443 Wilshire Blvd., Los Angeles, Calif.

Sawdust as a cleaning compound for removing dirt and oil from aircraft parts after magnetic inspection, and prior to organic or inorganic treatment, is saving salvage, skin, man-hours, and critical materials. The new sawdust method, developed by Paul Lamb and Horace Maxfield at the Los Angeles plant, is inexpensive and easy to install and operate. By tumbling or rolling the part in a dry sawdust bath, the excess dirt and oil from all Magnafluxed parts is removed. The sawdust adhering to the part is blown off easily by a sharp blast from an air hose, leaving a thin film of oil to protect the part from corrosion.

Mention R182 When Writing or Using Reader Service

MANUFACTURERS' CATALOGS IN REVIEW

Preparing Aluminum for Spot Welding

The Diversey Corp., 53 W. Jackson Blvd., Chicago, Ill.

This technical bulletin points out that it has definitely been established that the production of consistently sound spot welds on aluminum surface is, in part, a function of the surface treatment. Presence of the oxide film and its attendant high electrical resistance cause irregularities that affect the uniformity and quality of the welds. Various methods, involving chemical and mechanical treatment, have been proposed from time to time for removing the oxide film and this treatise is a presentation of the Diversey process that has been in use at a number of large aircraft plants.

Mention R183 When Writing or Using Reader Service

Precision Products

P. R. Mallory & Co., Inc.,
3029 E. Washington St., Indianapolis 6, Ind.

This new 36-page catalog of precision products includes the complete line of Mallory radio, electrical and electronic parts, with sizes, dimensions and rated capacities, together with list prices. Thoroughly indexed, this should be an extremely helpful reference.

Mention R184 When Writing or Using Reader Service

Charging Bucket

Whiting Corp., Harvey, Ill.

Safety and time-saving features of the Sivyer type charging bucket for electric furnaces are clearly explained and illustrated in this new bulletin.

Mention R185 When Writing or Using Reader Service

Heat Resistant Coating

Geo. R. Mowat Co.,
24 W. 40th St., New York 18, N. Y.

Described in this leaflet as Hytemp Protective Coating, this material is said to resist temperatures up to 3500° F. on refractory material, metal equipment, graphite, crucibles, heat treating ovens and the like. It is applied by brush, spray or dipping, and after being set by heat, becomes part of the surface to which it is applied.

Mention R186 When Writing or Using Reader Service

Die-Less Duplicating

O'Neil-Irwin Mfg. Co.,
300 8th Ave. S., Minneapolis 15, Minn.

This 40-page booklet describes two new developments in this company's system of metal duplicating without dies. The Di-Acro Radius Brake and the Di-Acro Bender No. 3 are described and illustrated, along with other precision machines that have been employed by several aircraft manufacturers for fabrication of various parts.

Mention R187 When Writing or Using Reader Service

Fireclay Brick

McLeod & Henry Co., Inc., Troy, N. Y.

Three new fireclay brick products, Hyex, Super-Hyex and Superam, are introduced in this new bulletin. These products are designed to supply the demand for fireclay bricks possessing greater spalling resistance, greater load bearing strength and greater volume of stability.

Mention R188 When Writing or Using Reader Service

Carbon Seal Rings

Pure Carbon Co., Inc., Saint Marys, Pa.

An illustrated booklet, dealing with carbon seal rings and their application to the bellows type shaft seals, has just been issued by this company. Features of carbon seal rings are detailed with relation to specific uses. Information is given on seals for automobile water pumps, steam turbines, air seals, seal noses and various other applications.

Mention R189 When Writing or Using Reader Service

Riveting Tools

Emerson Engineering Co.,
1418 S. Flower St., Los Angeles 15, Calif.

This new catalog is devoted exclusively to riveting tools and equipment. It is completely illustrated and divided into sections and indexed for ready reference. Sections are on rivet sets, squeezer sets, dimpling tools, bucking bars, Hi-Shear riveting tools, and general riveting information.

Mention R190 When Writing or Using Reader Service

Metal Spraying

Metallizing Engineering Co., Inc.,
Long Island City, N. Y.

Featuring the November-December issue of "Metco News" is a comprehensive article on maintenance methods that are said to be saving industry time, money and materials through the use of the metallizing method. Article emphasizes the use of metal spraying on railroad maintenance to extend wear and salvage worn equipment.

Mention R191 When Writing or Using Reader Service

Direct-Fired Heaters

Dravo Corp., 300 Penn Ave., Pittsburgh 22, Pa.

This 16-page bulletin on direct fired heaters deals chiefly with the economy of use and installation of these heaters and their flexibility of application. Diagrams showing nine basic designs and giving B.t.u. capacities, dimensions, and specifications on 44 models are shown.

Mention R192 When Writing or Using Reader Service

Glyco Chemicals

Glyco Products Co., Inc., 26 Court St., Brooklyn, N. Y.

This new 144-page catalog includes a number of plasticizers for synthetic rubber, synthetic resins, etc., as well as further information on the esters manufactured by the company. The manual is complete with formulae, suggestions and tables of useful chemical and physical data.

Mention R193 When Writing or Using Reader Service

Processed Steels

W. J. Holliday & Co., Hammond, Ind.

A 32-page booklet which pictorially and textually amounts to a scientific treatise on two carbon steels—Speed Case and Speed Treat—has been issued by this company. Speed Case is the trade name for a low carbon, open-hearth, free machining steel while Speed Treat is the trade name for a medium carbon, open-hearth, high tensile, free machining steel. Both are produced under Holliday patents. A wealth of tables, charts, formulae and illustrations are presented.

Mention R194 When Writing or Using Reader Service

Furnace Equipment

Leeds & Northrup Co.,
4934 Stenton Ave., Philadelphia, Pa.

Anyone who has a problem involving the heat treatment of tools, dies or small production parts will be interested in this 36-page catalog on the Vapocarb-Hump method for heat treatment of steel. A triple-control method of hardening is described which is said to guard the steel from abnormal stress, and hardening losses due to warpage and breakage are reduced to a minimum.

Mention R195 When Writing or Using Reader Service

Valve Selection Chart

Reading-Pratt & Cady Div.,
American Chain & Cable Co., Inc., Bridgeport, Conn.

Valve selection made easy is the theme of this new valve selection chart. Available on 11½ x 17-in. heavy cardboard, the chart presents a simplified breakdown of conditions to consider when selecting, and an explanation of what these conditions determine in the operation of a valve. It is a slide-rule for valve selection.

Mention R196 When Writing or Using Reader Service

Flow Rate Alarm

Fischer & Porter Co., Hatboro, Pa.

This bulletin describes new Rota-Sight flow rate alarm and Rota-Sight for use on liquid and gas flow. Equipment is a check on rate of flow and a protection against dangerously low or high flows. Alarm positions are adjustable.

Mention R197 When Writing or Using Reader Service

Band Filing

Continental Machines, Inc.,
1301 Washington Ave., S., Minneapolis 4, Minn.

The DoAll continuous band filing machine is described and pictured in this 4-page bulletin, which illustrates the machine in operation on various internal and external file broaching jobs.

Mention R198 When Writing or Using Reader Service

Electronic Tubes

Electronics Dept., General Electric Co.,
Schenectady, N. Y.

A new quick-selection chart of electronic tubes for industry is contained in this 4-page bulletin.

Mention R199 When Writing or Using Reader Service

Aluminum Engineering Notebook

Aluminum Co. of America, Oliver Bldg., Pittsburgh, Pa.

As a stimulator of "Imagineering"—the art of letting your imagination soar and then engineering it down to earth—this 24-page book first presents 12 important economic advantages of aluminum and, second, illustrates numerous examples of things which have been imagineered into aluminum actualities. All of these examples are based on one or more of the economic advantages of aluminum thumb-tabbed as a helpful index.

Mention R200 When Writing or Using Reader Service

New Voss Leveler Bulletin

Voss Machinery Co.,
2876 W. Liberty Ave., Pittsburgh 16, Pa.

Illustrating many installations of the Voss Roller Leveler, this 6-page leaflet describes each, emphasizing the work on armor plate leveling.

Mention R201 When Writing or Using Reader Service

Amercoat Plastic Coatings

American Concrete & Steel Pipe Co.,
Box 3428, Terminal Annex P.O., Los Angeles, Calif.

A combination of the most inert of the new thermoplastic resins, Amercoat is described in this 16-page catalog as a protection against corrosion and contamination. Amercoat and its inherent properties are described and many applications are cited. With regard to machinery, for example, it is said that Amercoat, being thermoplastic, follows the metal to which it is applied during expansion and contraction caused by temperature variations, and does not fracture or chip easily or loosen up through vibration. A sharp blow may dent the surface, but will not shatter it.

Mention R202 When Writing or Using Reader Service

Low Temperature Welding

Eutectic Welding Alloys Co.,
40 Worth St., New York 13, N. Y.

This is a comprehensive 36-page review of progress and presents wide applications of the Eutectic low temperature welding process. The book discusses a great variety of uses together with practices in connection with ferrous and non-ferrous metals. Included is a rod selector wall chart.

Mention R203 When Writing or Using Reader Service

Technical Reviews

The Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

Twenty-four individual reports running to nearly 100 pages on the use and effects of titanium in steels and cast irons are presented in this comprehensive ring-binder. Many of the reports are original papers by Dr. George F. Comstock and others have been presented before the American Society for Metals, in **Metal Progress** and other publications.

Mention R204 When Writing or Using Reader Service

Neutral Baths

The A. F. Holden Co., New Haven 8, Conn.

Many applications and advantages of neutral baths for hardening and tempering are cited in this 28-page booklet. It pictures many products and describes methods of treatment, together with detailed directions on use.

Mention R205 When Writing or Using Reader Service

Industrial X-Ray Unit

Picker X-Ray Corp., 300 Fourth Ave., New York.

Detailed descriptions and illustrations of Picker 250-kv. industrial X-ray units of three types—jib crane, mobile and dolly—are given in this 28-page catalog. One of the features is a blueprint diagram for a typical layout of an industrial X-ray department.

Mention R206 When Writing or Using Reader Service

Operating Information on Stellite Tools

Haynes Stellite Co., Kokomo, Ind.

This 8-page booklet is intended to help users obtain the best possible results with Stellite 98M2 cobalt-chromium-tungsten turning and boring tools and milling cutters. Through drawings, photographs and charts, the booklet explains cutting angles, speeds and feeds, chip-breaker grinds and grinding wheels that are recommended for use with these tools and cutters.

Mention R207 When Writing or Using Reader Service

Quenching Oil Coolers

The Sims Co., P. O. Box 1096, Erie, Pa.

Quenching oil coolers as a safe, practical and economical method of cooling the oil used in quenching steel or other metals to be heat treated are described in this 4-page leaflet. Diagrammed is a typical quenching oil tank with Sims oil cooler installation.

Mention R208 When Writing or Using Reader Service

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